

Logarithme  
vnde l'annu  
d'ice i p'lo  
aut elige  
—  
MDXX

—  
Luzier  
—  
16.2  
—

37  
—  
21



*Math Tables* ★ ★  
REESE LIBRARY  
OF THE  
UNIVERSITY OF CALIFORNIA.  
Received *Oct.*, 1891  
Accessions No. *45153* Shelf No.

QA33  
N35  
1930  
etc

„In *Barbich*, in der Nachbarschaft  
des See *Lomond* und nicht weit vom  
Fleisse *Leven*, wurde Lord *Napier*,  
der Erfinder der Logarithmen geboren“.  
Allg. Geogr. Ephemeriden, Band V.  
Weimar 1800. Seite 542.



LOGARITHMORVM  
CANONIS DESCRIPTIO.

S E V

ARITHMETICARVM SVPPVTATIONVM  
MIRABILIS ABBREVIATIO.

*Eiusque vsus in vtraque Trigonometria. vt etiam in omni  
Logistica Mathematica, amplissimi, facillimi &  
expeditissimi explicatio.*

Authore ac Inuentore IOANNE NEPERO,  
Barone Merchistonij, &c. SCOTO.



LVGDVNI,  
Apud Barth. Vincentium.

M. DC. XX.

*Cum Priuilegio Caesar. Majest. & Christ. Galliarum Regis.*





Q. A33

N35

CASE  
R

45/53



Illustrissimo, & optimæ spei  
PRINCIPI CAROLO,  
POTENTISSIMI, ET INVICTISSIMI,  
IACOBI D. G.  
MAGNÆ BRITANNIÆ,  
ET HIBERNIÆ REGIS,  
Filio vnico, V Valliæ Principi, Duci Eboraci,  
& Rothesiæ, magno Scotiæ Senescallo, ac  
Insularum Domino, &c.

D. D. D.



*QVVM nullum sit studium, vel doctrinæ genus  
( Illustrissime Princeps ) quod generosa ac he-  
roïca ingenia, ad præclara quæque & sublimia  
magis acuat, contrâque tarda & insulsa pectora  
magis obtundat, quàm mathesis: non mirandum est eruditos  
& magnanimos Principes eam magnoperè præteritis omni-  
bus seculis in deliciis habuisse, imperitos vero & ignavos  
homines eandem velut ignorantia sua & ignavia hostem,  
A 2      semper*



semper odio acerrimo prosequutos esse. Cur non igitur nuntium hoc nostrum inuentum, cum obtusa ingenia & humi repentia refugiat, ad sublime Celsitudinis tuæ ingenium & patrocinium confugiet & transuolabit? Præsertim cum noua hæc Logarithmorum methodus, omnem illam pristina Matheseos in calculo difficultatem ( quæ alioqui generosam tuam indolens offendere posset ) penitus è medio tollat: & ad subleuandam memoriæ imbecillitatem ita se accommodet, ut illius adminiculo facile sit, plures quæstiones mathematicas vnius horæ spatio, quàm pristina & communiter recepta forma sinuum, tangentium, & secantium, vel integro die absoluere. Ideoque tuæ Celsitudini tantò gratius hoc inuentum fore speramus, quantò facilem magis & expeditam reddit Logisticam: quid enim incundius, & in omni disciplinarum genere præstantius esse possit, quàm præclara quæque & sublimia, exactè, ex tempore, facili negotio, nulloque vel temporis vel laboris dispendio expedire? Rogamus igitur ( Serenissime Princeps ) ut munusculum hoc, licet exiguum, & longe infra meritorum & dignitatis tuæ fastigium, certissimi tamen obsequij pignus & symbolum, pro humanitate tuæ boni consulas. Quod si te fecisse intellexero, vel hac sola ratione animos mihi jam morbis penè confecto addideris, ad alia propediem, his fortasse maiora & tanto principe magè digna molendum. Interim illustrissimos tuos parentes magna magna BRITANNIAE luminaria, teque præclarum tam præclaræ stirpis ramum, & futuræ nostræ tranquillitatis spem, diu nobis incolumes seruet & protegat summus ille Rex Regum, & Dominus dominantium, cui omnis honor & gloria in æternum tribuatur.

Serenissimæ tuæ Celsitudinis obsequio  
addictissimus

IOANNES NEPERVS.

IN MIRIFICVM LOGARITHMORVM  
Canonem

PRÆFATIO.

 VVM nihil sit ( charissimi mathematicum cultores ) mathematicæ praxi tam molestum, quodque Logistas magis remoretur, ac retardet, quàm magnorum numerorum multiplicationes, partitiones, quadratæque ac cubicæ extractiones, quæ præter prolixitatis tedium, lubricis etiam erroribus plurimum sunt obnoxia: Cœpi igitur animo reuoluere, quâ arte certâ & expedita, possem dicta impedimenta amoliri. Multis subinde in hunc finem perpensis, nonnulla tandem inueni præclara compendia, alibi fortasse tractanda: verùm inter omnia nullum hoc vtilius, quod vnà cum multiplicationibus, partitionibus, & radicum extractionibus arduis & prolixis, ipsos etiam numeros multiplicandos, diuidendos, & in radices resoluendos ab opere reiiecit, & eorum loco alios substituit numeros, qui illorum munere fungantur per solas additiones, subtractiones, bipartitiones, & tripartitiones. Quod quidem arcanum, cum ( vt cætera bona ) sit, quo communius, eo melius: in publicum mathematicorum vsum propalare libuit. Eo itaque liberè fruamini ( matheseos studiosi ) & quâ à me profectum est beneuolentiâ, accipite. Valere.

Ad



AD LECTOREM TRIGONOMETRIAE  
*studiosum.*

**Q**ui Cœli, atque soli, & sinuosos æquoris arcus  
Metiri, & curuos vis numerare gradus;  
Quique per expansum terras cognoscere rectas,  
Mensurat radio quas GEODÆTA suo:  
Macte ño, insta operi, LOGARITHMIS vtere, quos hîc  
Rara Caledonij, dat Baro, gemma soli.  
Frostrâ erit hinc multis tabulas extendere chartis:  
Frustrâ erit & calamo crebra litura tuo.  
Quæ nisi multiplici nunquam potuere priores,  
Actu vno hîc facili tu numerare queas.  
Ad SOPHIAM quid ferto noui, quod pristina vincat,  
Quisquis ab ingenio nomen habere cupis.

PATRICIVS SANDÆVS.



IN LOGARITHMOS D. I. NEPERI.

**R**egiomontanus fertur per apheræsim, atque  
Prosthesein ignotos eliciisse sinus:  
Atque aliquos aliquot sinuum quæ sita Logistas  
Consimili legimus notificasse modo:  
Nmo tamen cunctos poterat sic soluere nodos,  
cAut certâ rectam lege docere viam.  
Musarum NEPERVS honos, & gloria gentis  
Scotigenæ, paruo præstat vtrumque libro.  
Nomine sic NEPAR, PARILI fit & omine NON PAR,  
Quum non hac habeat NEPAR in arte PAREM.



ALIVD.

**B**VCHANANE tibi NEPERVM adscisce sodalem,  
Floreat & nostris Scotia nostra viris:  
Nam velut ad summum culmen perducta Poësis  
In te stat, nec quò progrediatur habet:  
Sic etiam ad summum est culmen perducta Mathesis,  
Inque hoc stat, nec quò progrediatur habet.

ANDREAS IVNIUS.

*Philosophia Professor in Academia Edimburgena.*





IDEM AVTHOR AD LECTOREM.

**H**ic liber est minimus, si spectes verba, sed vsum  
Si spectes, Lector, maximus hic liber est.  
Disce, scies paruo tantum debere libello  
Te, quantum magnis mille voluminibus.

ANDREAS IVNIVS.

*Philosophiae Professor in Academia Edimburgena.*



IN LOGARITHMOS.

**Q**uæ tibi cunque sinus, tangentes atque secantes  
Prolixo præstant, atque labore graui:  
Absque labore graui, & subito tibi, Candide Lector,  
Hæc Logarithmorum parua tabella dabit.



MIRI



MIRIFICI  
LOGARITHMORVM

CANONIS DESCRIPTIO,  
EIVSQVE VSVS IN VTRAQVE TRIGO-  
nometria, vt etiam in omni Logistica Mathemati-  
ca, amplissimi, facillimi, & expeditissimi explicatio.

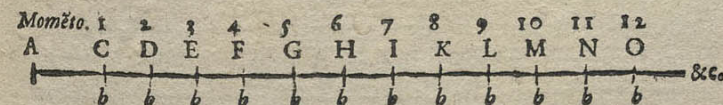
LIBER PRIMVS.

DE DEFINITIONIBVS.

CAP. I.

Definitio I.

**I**N ÆA equaliter crescere dicitur, quum punctus  
eam describens, equalibus momentis per aqualia in-  
terualla progreditur.



Sit punctus A, à quo ducenda sit linea fluxu alterius puncti,  
qui sit B. fluat ergo primo momento B ab A in C. Secundo  
momento à C in D. Tertio momento à D in E. atque ita  
deinceps in infinitum describendo lineam A C D E F, &c.

B                      inter



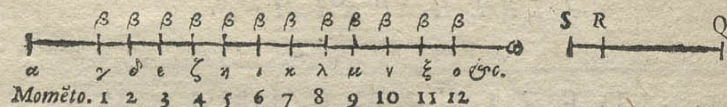
interuallis AC, CD, DE, EF, & cæteris deinceps æqualibus, & momentis æqualibus descriptis: dicetur hæc linea per definitionem superius traditam æqualiter crescere.

## Corollarium.

Vnde hoc incremento quantitates æquidifferentes temporibus æquidifferentibus produci est necesse.

Vt in superiori schemate unico momento Bab A in C, & tribus momentis ab A in E progressum est. Sic sex momentis ab A in H, & octo momentis ab A in K. Sunt autem illorum momentorum vnus & trium, & horum sex & octo differentiarum æquales, scilicet duorum. Sic etiam erunt quantitarum illarum AC, & AE, & harum AH, & AK differentiarum CE, & HK, æquales: æqui differentes ergo, vt supra.

2. Linea proportionaliter in breuiorem decrescere dicitur, quam punctus eam transcurrens æqualibus momentis, segmenta abscindit eiusdem continuo rationis ad lineas à quibus abscinduntur.



## Exempli gratia.

Sit linea sinus totius  $\alpha\omega$  proportionaliter minuenda. Sit punctus transcursum suo eam minuens  $\beta$ . Sit denique ratio segmentorum singulorum ad lineas à quibus abscinduntur, vt Q. R ad Q. S. Quæ ergo ratione secatur Q. S. in R. eadem ratione (per 10. 6. Eucl.) secetur  $\alpha\omega$  in  $\gamma$ . atque sic  $\beta$  transcurrens ab  $\alpha$  in  $\gamma$  primo momento ab  $\alpha\omega$  abscindat  $\alpha\gamma$ . relicta linea seu sinu  $\gamma\omega$ . Ab hac autem  $\gamma\omega$  procedens  $\beta$  secundo momento abscindat simile segmentum quale est Q. R ad Q. S. quod sit  $\gamma\delta$ . relicto sinu  $\delta\omega$ . A quo proinde tertio momento abscindat  $\beta$  simili ratione segmentum  $\delta\epsilon$ . relicto sinu  $\epsilon\omega$ . A quo similiter quarto momento abscindatur (fluxu  $\beta$ ) segmentum  $\epsilon\zeta$ . relicto sinu  $\zeta\omega$ . Ab hoc  $\zeta\omega$ , quinto momento abscindat  $\beta$  eadem ratione segmentum  $\zeta\eta$ . relicto sinu  $\eta\omega$ . Et ita deinceps, in infinitum. Dico itaque hic sinus totius lineam  $\alpha\omega$  (ex præmissa definitione) proportionaliter decrescere.

decrescere in sinum  $\gamma\omega$ . aut in alium quemuis vltimum in quo sistit  $\beta$  & sic in aliis.

## Corollarium.

Vnde hoc æqualibus momentis decremento, eiusdem etiam rationis proportionales lineas relinqui est necesse.

Quæ enim superius est continua proportio sinuum minuendorum,  $\alpha\omega, \gamma\omega, \delta\omega, \epsilon\omega, \zeta\omega, \eta\omega, \theta\omega, \iota\omega, \kappa\omega, \lambda\omega, \mu\omega, \nu\omega, \xi\omega, \omicron\omega, \pi\omega, \rho\omega, \sigma\omega, \tau\omega, \upsilon\omega, \phi\omega, \chi\omega, \psi\omega, \omega\omega$ . atque segmentorum ab eis abscissorum  $\alpha\gamma, \gamma\delta, \delta\epsilon, \epsilon\zeta, \zeta\eta, \eta\theta, \theta\iota, \iota\kappa, \kappa\lambda, \lambda\mu, \mu\nu, \nu\xi, \xi\omicron, \omicron\pi, \pi\rho, \rho\sigma, \sigma\tau, \tau\upsilon, \upsilon\phi, \phi\chi, \chi\psi, \psi\omega$ . Eadem erit necessario etiam sinuum relictorum proportio, scilicet,  $\gamma\omega, \delta\omega, \epsilon\omega, \zeta\omega, \eta\omega, \theta\omega, \iota\omega, \kappa\omega, \lambda\omega, \mu\omega, \nu\omega, \xi\omega, \omicron\omega, \pi\omega, \rho\omega, \sigma\omega, \tau\omega, \upsilon\omega, \phi\omega, \chi\omega, \psi\omega$ . vt ex 19. prop. 5. & 11. prop. 7. Eucl. patet.

3. Quantitates surdæ, seu numero inexplicabiles, numeris quàm proximè definiendi dicuntur, quum numeris masculis, qui à veris surdarum valoribus unitate non differant, definiuntur.

Vt sit semi-diameter seu sinus totus rationalis numerus 10000000. erit sinus 45. graduum radix quadrata 4500000000000000. quæ surda seu irrationalis & numero inexplicabilis est, atque inter terminos 7071067. minorem, & 7071068. maiorem includitur. Ab horum itaque vtrius non differt unitate. Surdus igitur sinus ille 45. graduum quàm proximè dicitur definiendi & explicari, quum per numeros integros 7071067 vel 7071068. neglectis fractionibus definitur. In magnis etenim numeris ex fragmentis unitatis spreis nullus error sensibilis emergit.

4. Synchroni motus sunt, qui simul & eodem tempore sunt.

Vt in superioribus esto quod B. moueatur ab A in C. eodem tempore quo  $\beta$ . mouetur ab  $\alpha$  in  $\gamma$ . dicentur rectæ AC, &  $\alpha\gamma$  synchrono motu describi.

## Definitio &amp; Postulatio.

5. Quum quolibet motu & tardior & velocior dari possit, sequitur necessario cuique motui æquinoctem (quem nec tardiozem, nec velociorem definimus) dari posse.

6. Logarithmus ergo cuiusque sinus, est numerus quem proximè definiens lineam, quæ æqualiter creuit interea dum sinus totius linea proportionaliter in sinum illum decreuit, existente viroque motu synchrono, atque initio æquinoctem.



# LIB. I. CAP. I.

Exempli gratia.



Reperantur ambo superiora schemata & moueatur B. semper & ubique eadem seu aequali velocitate qua coepit moueri  $\beta$  initio quum est in  $\alpha$ . deinde primo momento procedat B. ab A in C, & eodem momento procedat  $\beta$  ab  $\alpha$  in  $\gamma$  proportionaliter: erit numerus definiens A C logarithmus linearis, seu sinus  $\gamma \alpha$ . Tum secundo momento promoueatur B à C in D, & eodem momento promoueatur proportionaliter  $\beta$  à  $\gamma$  in  $\delta$ . erit numerus definiens A D logarithmus sinus  $\delta \alpha$ . Sic tertio momento procedat aequaliter B à D in E, & eodem momento promoueatur proportionaliter  $\beta$  à  $\delta$  in  $\epsilon$ , erit numerus definiens A E logarithmus ipsius sinus  $\epsilon \alpha$ . Item quarto momento procedat B in F, &  $\beta$  in  $\zeta$ , erit numerus A F logarithmus sinus  $\zeta \alpha$ . Atque eodem continuo seruato ordine erit (ex definitione superius tradita) numerus A G logarithmus sinus  $\eta \alpha$ . A H logarithmus sinus  $\theta \alpha$ . A I logarith. sinus K  $\alpha$ . A K logarith. sinus  $\lambda \alpha$ . & ita in infinitum.

## Corollarium.

Unde sinus totius 10000000. nullū seu 0 est logarithmus: & per consequens, numerorū maiorū sinu toto logarith. sunt nihilo minores.

Quum enim ex definitione pateat, quod à sinu toto decrecentibus sinibus, à nihilo accrescant logarithmi, idē contra crescentibus numeris (quos adhuc sinus vocamus) in sinum totum, scilicet in 10000000. decrecant, in 0, seu nihilum logarithmi est necesse. Et per consequens numerorum crescentium ultra sinum totum 10000000. (quos secantes aut tangentēs, & non amplius sinus vocamus) logarithmi erunt minores nihilo.

Itaque

# LIB. I. CAP. II.

Itaque logarithmos sinuum, qui semper maiores nihilo sunt, abundantes vocamus, & hoc signo  $\dagger$ , aut nullo prae notamus. Logarithmos autem minores nihilo defectiuos vocamus, prae notantes eis hoc sinum. —

## ADMONITIO.

Erat quidem initio liberum cuilibet sinui, aut quantitati nullum seu 0, pro logarithmo attribuisse: sed praestat id praeter ceteris sinui toti accommodasse: ne vnquam in posterum vel minimam molestiam parturiret nobis additio & subtractio eius logarithmi in omni calculo frequentissimi. Ceterum etiam quia sinuum & numerorum sinu toto minorum frequentior est usus: eorum igitur logarithmos abundantes ponimus: aliorum verò defectiuos, etsi contra fecisse initio liberum erat.

## DE LOGARITHMORVM

propositionibus.

## CAP. II.

### Propositio I.

Proportionalium numerorum, aut quantitatum, aequi-differentes sunt Logarithmi.

Vt proportionalium sinuum, scilicet  $\gamma \alpha$  qui se habet ad  $\epsilon \alpha$ , vt  $\epsilon \alpha$  ad  $\lambda \alpha$ . Logarithmi respectiue sunt numeri definiētes A C, A E, A H, & A K, (vt per def. 6. patet.) differunt autem A C, & A E differentia C E; atque A H, & A K differentia H K. Sunt autem ex 1. def. & suo corollario C E, & H K aequales: aequi-differentes igitur sunt logarithmi praefatorum sinuū proportionalium. Et ita in omnibus proportionalibus.

Nam quas affectiones & symptomata Logarithmi ab ortu & genesi sua acquisierint, eas imposterum retineāt, est necesse. Ab ortu autem & in genesi sua imbuuntur hac affectione, & hac lex illis praescribitur, vt sint aequi-differentes, quum

B 3

eorum



eorum sinus seu quantitates sint proportionales ( prout ex def. Logarithmi, & vtriusque motus patet, & in constructione logarithmorum amplius aliquando patebit, ) proportionalium ergo quantitatum æquidifferentes sunt Logarithmi.

2. *Ex trium proportionalium Logarithmis, duplum secundi seu medij minutum primo, æquatur tertio.*

Quum, per prop. 1. differentia logarithmorum primi & secundi æquetur differentia logarithmorum secundi & tertij, id est, secundus minutus primo æquetur, tertio minus secundo: Ideo addito secundo ad vtrumque æquationis latus proveniet bis secundus seu duplum secundi minutum primo æquale tertio, quod erat probandum.

3. *Ex trium proportionalium logarithmis, duplum secundi seu medij æquatur aggregato extremorum,*

Ex præcedente prop. 2. duplum secundi minutum primo æquatur tertio. Vtrique æqualium laterum adde primum, & exurget duplum secundi æquale primo & tertio, id est, aggregato extremorum, quod erat demonstrandum.

4. *Ex quatuor proportionalium logarithmis, aggregatum secundi & tertij minutum primo æquatur quarto.*

Quum per 1. prop. ex quatuor proportionalium logarithmis, secundus minutus primo, æquetur quarto minus tertio, vtrique æqualitatis lateri, adde tertium, & fient secundus & tertius minuti primo æquales quarto, quod erat propositum.

5. *Ex quatuor proportionalium logarithmis aggregatum mediorum (secundi, scilicet, & tertij) æquatur aggregato extremorum, primi videlicet, & quarti.*

Per prop. 4. præcedentem, secundus & tertius minuti primo erant æquales quarto: vtrique æqualitatis lateri adde primum, & fiet secundus, plus tertio æqualis quarto, plus primo, quod demonstrandum erat.

6. *Ex quatuor continuè proportionalium logarithmis triplum alterius mediorum æquatur aggregato extremi remoti, & dupli vicini.*

Per secundam prop. duplum secundi seu medij minutum primo est æquale tertio: & per tertiam prop. duplum, huius, quod est, quadruplum secundi minutum duplo primi, æquabitur aggregato suorum extremorum, videlicet quarto plus secundo.

cundo. Iam si ab utroque æqualitatis latere subduxeris secundum, fiet triplum secundi minutum duplo primi æquale quarto: huius rursus æqualitatis lateribus adde duplum primi, & exurget triplum secundi æquale quarto plus primi duplo: quod probandum suscepimus.

### AD MONITIO.

Hæc usque logarithmorum genesin & symptomata explicauimus: quo verò calculo, quæue logistica methodo habeantur, hoc loco explicandum foret. Sed quia ipsum canonicum integrum, eiusque logarithmos omnes cum suis sinibus ad singulas quadrantis minutias primas exhibemus, ideo in tempus magis idoneum doctrinam constructionis logarithmorum transilientes, ad eorum usum properamus, ut prælibatis prius usu, & rei utilitate, cætera aut magis placeant post hac edenda, aut minus saltem displiceant silentio sepulta. Præstolor enim eruditorum de his iudicium & censuram, priusquam cætera in lucem temerè prolata liuidorum detractationi exponantur.

### DESCRIPTIONEM COMPLECTENS tabulæ logarithmorum, & septem eius columnarum.

### CAP. III.

#### Sectio I.

Prima columna est expressè arcuum ab 0. in 45. Grad. crescentium: & subintelligitur esse etiam suorum ad semicirculum reliquorum.

2. Septima autem columna est arcuum à quadrante in 45. graduum decrecentium: & subintelligitur esse etiam suorum ad semicirculum reliquorum.

3. Unde alterius columna arcus, sunt arcuum alterius è regione respondentium complementa.

4. Alique



4. Atque in prima exprimitur omnis trianguli rectilinei rectanguli angulus acutus minor.
5. In septima autem ei è regione collocatur eiusdem rectanguli angulus acutus minor.
6. In secunda columna sunt sinus arcuum prima columna.
7. Suntque hi crus minus subtendens minorem angulum rectanguli, cuius basis, seu hypotenusa est sinus totus.
8. In sexta columna sunt sinus arcuum septima columna.
9. Suntque hi crus maius subtendens maiorem angulum eiusdem rectanguli, cuius scilicet hypotenusa est sinus totus.
10. Unde omni triangulo rectilineo rectangulo fit equiangulum & simile ex sinu toto, & sinu secunda columna, & sinu sexta ei è regione respondente.
11. Tertia columna continet Logarithmos arcuum, & sinuum sinistrorum.
12. Qui sunt Logarithmi proportionis cruris minoris rectanguli ad eiusdem hypotenusam.
13. Itemque hi sunt arcuum, & sinuum dextrorum Logarithmi complementorum, quos antilogarithmos appellamus.
14. Quinta columna continet Logarithmos arcuum, & sinuum dextrorum.
15. Qui sunt logarithmi proportionis cruris maioris rectanguli ad eiusdem hypotenusam.
16. Itemque hi sunt arcuum & sinuum sinistrorum antilogarithmi, seu logarithmi complementorum.
17. Quarta denique seu media columna continet differentias inter logarithmos tertia columna, & quinta. Unde duplex est hæc columna, Abundans & defectiva.
18. Abundantes sunt differentia, qua oriuntur ex subtractione logarithmorum quinta à logarithmis tertia.
19. Defectivæ verò, sunt differentia orta ex subductione logarithmorum tertia à logarithmis quinta: qua ideo sunt minores nihilo.
20. Differentia abundantes dicuntur differentiales numeri, arcuum sinistrorum.
21. Suntque logarithmi proportionis minoris cruris rectanguli ad eiusdem crus maius.

22. Item

22. Itemque sunt Logarithmi secundorum, sine tangentium arcuum sinistrorum.
23. Differentia autem defectiva dicuntur numeri differentiales arcuum dextrorum.
24. Suntque Logarithmi proportionis maioris cruris rectanguli ad eiusdem crus minus.
25. Itemque sunt Logarithmi secundorum, sine tangentium arcuum dextrorum.
26. Omnis etiam arcus sinister, eiusque ad semicirculum reliquus, dicitur arcus complementi arcuum, sinuum, & Logarithmorum dextrorum, atque differentialium defectivorum.
27. Et contra, omnis arcus dexter, eiusque ad semicirculum reliquus, dicitur arcus complementi arcuum, sinuum, & Logarithmorum sinistrorum, atque differentialium abundantium.

## ADMONITIONES.

28. **H**ic notandum est, si Logarithmos tertia columna defectivos feceris (proposito scilicet — signo,) fient Logarithmi hypotenusarum, sine secantium arcuum dextrorum septima columnæ.
29. Et hi etiam fient Logarithmi proportionis hypotenusa rectanguli ad eiusdem crus minus.
30. Et si Logarithmos quinta columna defectivos feceris, fient Logarithmi hypotenusarum, sine secantium arcuum sinistrorum prima columna.
31. Fient etiam hi Logarithmi proportionis hypotenusa rectanguli ad eiusdem crus maius. Verum quia ad rectilinearum scientiam comparandam, soli sinus, eorumque arcus, & logarithmi cum differentialibus: ad Sphericorum autem, spretis sinibus, soli arcus, & eorum logarithmi, & differentiales sufficiunt: ideo hypotenusas & secundos tabula exclusimus: sicuti & sinus ipsos in sphericis negligi volumus, Ostendimus tamen obiter te posse (si libuerit) eis omnibus satis expedire in rectilineis uti, in sphericis verò minime.

CAP.

C



DE VSV TABULÆ ET NVMERORVM EIVS.  
CAP. IV.

Sectio I.

**S**inum, tangentium, & secantium præcisè in tabulis suis reperi-  
rum, Logarithmos non minus præcisè dare.

Per sect. 11. & 14. cap. 3. reperi sinu dato in secunda, aut septima columna nostræ tabulæ, reperietur eius Logarithmus in eiusdem lineæ tertia vel quinta columna. Habentur igitur sic exactè sinuum tabulatorum logarithmi. Tangentium autem & secantium numeris in suis tabulis reperi arcus. Ex arcibus verò cognitis nostra tabula exhibet tangentium logarithmos seu differentiales cum signis suis in media columna per sect. 22. & 25. Et secantium logarithmos reciproçè in tertia & quinta columna, præposito tamen his — signo per sect. 28. & 30. Habentur igitur sinuum, tangentium, & secantium tabulatorum logarithmi.

*Exempla sinuum.*

**S**inus 6946584. Logarithmum quæro. Sinum illum præcisè reperi in secunda columna respondentem arcui 44. Gr. 0. m. & in eadem lineæ tertiæ columnæ adstat illi 3643349. suus logarithmus, quem quæsiui. Item sinus 7213574. quærat logarithmus. Sinus hic inuenietur respondens arcui 46. Gr. 10. m. & ei vicinus 3266204. logarithmus eius quæsitus.

*Exempla tangentium.*

**Q**uærat tangentis 2186448. logarithmus. Huic tangenti in sua tabula responder arcus 12. Gr. 20. m. & huic arcui in media columna tabulæ nostræ responder logarithmus, seu differentialis abundans 15203064. quæsitus. Item si tangentis 45736291. logarithmum quæsiueris, offendes in tabula tangentium eius arcum 77. Gr. 40. m. huiusque arcus in tabula nostra differentialem eandem, defectiuam tamen, scilicet — 15203064.

*Exem-*

*Exempla secantium.*

**S**ecanti 18118009. respondet in tabula secantium arcus 56. Gr. 30. m. & huic arcui in tabula nostra conuenit reciproçè defectiuus — 5943212. logarithmus secantis 18118009. superscripti. Sic secantis 13118337. inuenies logarithmum — 2714255. & secantis 13960592. offendes logarithmum — 3336533.

2. Numerorum datorum, & in tabulis sinuum, tangentium, & secantium non reperiotorum, logarithmos æstimare.

Numerum dato simillimum, siue is fuerit dati decuplus, centuplus, millecuplus, 10000<sup>plus</sup>, 100000<sup>plus</sup>, aut 1000000<sup>plus</sup>, quære in secunda, aut sexta columna tabulæ nostræ, aut si mauis, in tabulis tangentium, aut secantium: & huius arcum nota: eius enim logarithmus è tabula nostra elicitus, est quem quæris: mente tamen reseruando, aut memoriæ gratiâ notis exprimendo numerum locorum, seu figurarum multipliciter. Vt si quærat logarithmus numeri 137. in tabulis non reperi: reperies inter sinus numeros 14544. 136714. & 1371564. & inter tangentes 13705046. inter secantes verò numerum 13703048, qui est omnium dato simillimus, dummodò eius vltimæ vel dextimæ quinque figuræ deleri subintelligantur: huius ergo secantis 13703048. & sui arcus 43. Gr. 8. m. logarithmus (per præced. aut per sect. 28. & 30. cap. 3.) quærat, & inuenietur — 3150332. qui pro logarithmo dati numeri 137. etiam habetur: recordando tamen vltimas quinque figuras abscindendas esse, aut memoriæ gratia expressè hoc modo signandas — 3150332. — 00000. Similiter si per tangentem 13705046. superius expressum quæsiueris logarithmum numeri 137. ex tangentis illius arcu 53. Gr. 53. m. inuenietur (per sect. 25.) in media columna — 3151790. logarithmus illius tangentis 13705046. qui quia excedit 137. datum quinque locis seu figuris, ideo — 3151790. — 00000. erit logarithmus numeri dati 137. Tanto tamen minus exactus est hic logarithmus, quanto magis 13705046. est dissimilis numero 13700000. seu centies millecuplo dati: sed hic error partes  $\frac{5046}{100000}$  unitatis

C 2 10000 non



non exuperat. Si tandem per sinum superscriptum 1371564. quassueris logarithmum dati 137. is (per hanc, & 11. sect. cap. 3.) deprehendetur esse 19866327 — 0000. Nec secus operandum erit signo † quando numerus figurarum datae quantitatis excedit numerum figurarum sinus ei simillimi, quod raro contingit: ut, si quærat numerum seu discretæ quantitatis 232702. logarithmus, inuenies in tabula sinum 23271. ei omnium simillimum, sed vnica deest huic figura. Huius ergo logarithmo tabulato (per sect. 11. cap. 3.) reperto, qui est 60631284, adiciatur vnica cyphra signo † interposito, & fiet 60631284†0. pro logarithmo numeri 232702. quæsit. Sed modus logarithmos æstimandi omnium optimus est, quo primò creati sunt: de quo alibi.

3. Vnde ut superiore prima sectione logarithmi simplices, & puri exhibentur: ita hac precedente appositis cyphris impuri emergunt.

4. Similium signorum logarithmos addere, est aggregatum vtriusque cum signo communi exhibere.

Vt ex additione — 56312. ad — 73495. proveniunt — 129807. Itemque addito 4216. ad † 5392. producuntur 9608. Sic 3219 — 00. ad 4360 — 000. faciunt 7579 — 00000.

5. Dissimilium signorum logarithmos addere, est differentiarum cum signo maioris numeri exhibere.

Vt ex additione — 210. ad 332. producitur † 122. Item ex additione — 210. ad 192. producitur — 18. Sic — 210. † 000. ad 332 — 00. sunt 122 † 0. Item — 210 — 000. ad 192 † 00. sunt — 18 — 0.

6. Duorum logarithmorum, hic illius defectiuus, ille autem huius abundans propriè dicitur: cum & numerum, & cyphras communes seu eosdem: signa verò omnia † & — penitus contraria habeant.

Vt abundantis 56312. defectiuus est — 56312. Item abundantis 56312 — 00. defectiuus est — 56312 † 00. Sic abundantis 56312 † 00. defectiuus est — 56312 — 00.

7. Abundantem subtrahere, est eius defectiuum addere.

Vt subtrahere abundantem 56312. ex — 73495. idem erit, quod addere illius defectiuum, qui (per 6.) est — 56312.

56312. ad eundem — 73495. fientque (per 4. præmissam) — 129807. Sic subtrahere 56312 † 00. ex — 73495 — 000. est idem quod addere — 56312 † 00. ad — 73495 — 000. fientque (per 4. & 5. præcedentes) — 129807 — 00000.

8. Defectiuum subtrahere est eius abundantem addere.

Vt subtrahere defectiuum — 4216. ex † 5392. est idem quod addere 4216. ad 5392. & (per 4.) producere 9608. Sic idem est subtrahere — 4216 † 00. ex 5392 † 0. quod addere 4216 — ad 5392 † 0. & producere 9608 — 0.

9. Logarithmum numero-tenus augere vel minuire saluo valore pristino, est ad illum addere, aut ab eo subtrahere quemuis ex logarithmis sequentibus, scilicet 23025842 † 0. vel 46051684 † 00. vel 69077527 † 000. vel 92103369 † 0000. vel 115129211 † 00000. nihil prorsus significantibus.

Vt sit logarithmus 39156 — 0. cui si addideris illorum quemuis, ut exempli gratia, 23025842 † 0. fiet inde 23064998. maior numero, valore autem prorsus idem qui 39156 — 0. Namque huius 39156 — 0. logarithmi, quantitas seu valor numeralis (per 12. & 13. sect. seq. huius) est 9960920. à quibus deme vnica figuram ultimam prout — 0. notat, & fiet 996092. Illius autem logarithmi 23064998. valor numeralis (per seq. sect. 12. & 13. huius) est etiam 996092. idem, qui prius.

#### Exemplum minutionis.

Si Logarithmus 25451769, minuendus, à quo si subduxeris 23025842 † 0. relinquitur 2425927 — 0. eiusdem valoris, cuius prior hic 25451769. Nam simplicis & puri logarithmi 2425927. valor est decuplus valoris vtriusvis eorum. Sunt ergo eorum valores inuicem æquales. Nihil enim aliud significat additio logarithmi 23025842 † 0. quam quod valor numeri cui additur, sit decupartiendus, & huic decimæ parti cyphra vnica sit adijcienda: subtractio verò eiusdem significat valorem logarithmi à quo subtrahitur decuplari, & ab hoc decuplo cyphram



cyphram unicam abici: remanet itaque in utrâque pristinus valor. Sic 46051684 † 00. additus significat ad centesimam partem valoris duas cyphras adiici: & subtractus, quod à centuplo duæ cyphræ reiciantur: & sic de reliquis supra expressis.

10. Si itaque ad logarithmum minus aliquod cyphris addideris, aut à logarithmo aucto cyphris subtraxeris aliquem ex logarithmis superscriptis totidem cyphrarum, producet ex impuro logarithmus purus eiusdem valoris.

Vt in superiore primo exemplo sit logarithmus impurus 39156 — 0. purgandus à cyphra sua & — signo, adde ergo illi 23025842 † 0, fiet inde, vt supra 23064998. logarithmus purus pristini valoris. Sic à logarithmo 63584468 † 00. impuro si subtraxeris 46051684 † 00. totidem scilicet cyphrarum, relinquetur logarithmus 17532784. purus, & eiusdem valoris, cuius prior ille impurus.

11. Si ad logarithmum numero defectiuum addideris, aliquem ex suprascriptis logarithmis nonæ sectionis numero maiorem, proueniet logarithmus eiusdem valoris numero abundans.

Vt ad logarithmum — 28595270 — 0000. adde quemuis ex numeris nonæ sectionis numero maiorem, v. g. 46051684 † 00. & fiet inde 17456414 — 00. eiusdem valoris, & numero abundans.

12. Logarithmorum in tabula nostra numero-tenus inuentorum sinus, tangentes, secantes seu numerales valores quoscunque exhibere poteris, per cap. 3. sect. 11. 14. 22. 25. 28. 30. siue sint puri, siue impuri.

Vt logarithmo 36. graduum & 40. minutorum, qui est 5155724. in tertia columna, respondet suus sinus 5971586. in secunda: & eius defectiuo — 5155724. respondet in tabula secantium 16745970. secans 53. Gr. 20. m. Item logarithmo differentiali 2950794. in quarta columna, respondet tangens (in sua tabula) 7444724 & eius defectiuo 2950794. respondet tangens 13432331. graduum scilicet, 53. & 20. minut. Sic logarithmi 2204930. in quinta columna numeralis valor est in sexta columna 8021232. sinus scilicet gr. 53. & 20. m. & eiusdem defectiui scilicet —

2204930. numeralis valor est secans 12466913. conueniens gradibus 36. & 40. min.

*Exemplum impurorum.*

Sit logarithmi impuri 97796 — 0. inquirendus valor. Huic numero-tenus respondet in tabula nostra sinus 9902681. à quo aufer dextimam figuram (provt — 0. indicat) & fiet 990268. valor logarithmi 97796 — 0. quæsitus. Sic logarithmi 25451769 † 00. valor est 78459100. quia logarithmo 25451769. puro respondet in tabula nostra sinus 784591. Item logarithmi — 349136 — 00. in quarta columna, apud gradum 46. reperi, valor erit 103553. quia tangens 46. graduum est 10355302. Sic logarithmi — 6350305 — 00. in tertia columna apud gradum 32. reperi, valor est 188708, quia secans complementi 32. graduum, scilicet 58. graduum, est 18870800. cuius duæ ultimæ & dextimæ figuræ 00. delendæ sunt propter — 00. annexa logarithmo.

13. Logarithmorum datorum, in tabula nostra non reperiuntur numerales valores æstimare.

Ad vulgares Geodesias sufficit plerumque, logarithmi tabulati propinquioris dato, numeralem valorem pro dati accipere: verum si propius ad meram accedere desideras, logarithmum datum per nonam huius numero-tenus auge, vel minue saluo valore pristino, donec aut in tabula reperiatur, aut alicui tabulato satis similis deuenierit, & huius logarithmi valor per præmissam inuentus, est quem quæris, vt exempli gratia, quæratu valor huius logarithmi 23149721 † 0. cui in tabula non reperiatur similis vel satis propinquus. verum si ab illo subduxeris 23025842 † 0. relinquetur 123879. cui sub 81 gradu reperiatur satis propinquus & similis 123881. cuius sinus 9876883. per præmissam inuentus, est valor oblato logarithmi 23149721 † 0. quæsitus.



## ADMONITIO.

**P**ro hac sectione, & secunda huius monitum volumus, numerorum datorum logarithmos, & contralogarithmorum datorum numerales valores (vbi non reperiuntur in tabula) omnium accuratissime exhiberi per modum ipsum quo creantur, aut resoluuntur logarithmi, qui est, ut à sinu dato per media Geometricè proportionalia descendas, donec in proximè minorem sinum tabularum perueneris: similiter ab huius logarithmo tabulato descendas etiam per totidem media Arithmetica congrua & horum ultimus erit illorum primi logarithmus: & contra per resolutionem, ut à logarithmo dato per media Arithmetica in logarithmum tabulatum proximè minorem descendas, & ab huius valore tabulato similiter etiam descendas per totidem media Geometrica & congrua: & horum ultimus erit numeralis valor illorum logarithmorum primi. Verùm quæ æqui-differentia Arithmetica cuique continuatæ proportioni Geometricæ conveniat & sit congrua, exquirere non est mediocris ingenij. Quare de his (Deo aspirante) vbi de logarithmorum condendis & creandis agetur, amplius aliquando differemus.

## DE AMPLISSIMO LOGARITHMORUM VŒU, &amp; EXPEDITA PER EOS PRAXI.

## CAP. V.

## Problema I.

**E**x trium proportionalium Logarithmis, dato logarithmo mediæ & altero extremo, reliquum extremum, eiusve proportionalem vel arcum, per unicam duplicationem & subtractionem dare.

Quæ

Quum per secundam prop. cap. 2. duplum mediæ (scilicet logarithmi) minutum altero extremorum æquetur reliquo, ideo à duplo mediæ logarithmi dati aufer logarithmum extremi datum, & reliquetur logarithmus extremi quaesiti: cui in tertia, quarta, aut quinta columna tabulæ inuenta respondet arcus in prima & septima: sinus autem in secunda, aut sexta: & sui secantes aut tangentes in tabulis suis per cap. 3. sect. 1. 2. 6. 8. 11. 14. 22. 25. 28. 30. pro extremo quaesito habentur.

## Exemplum.

**D**entur 10000000. primū proportionale, & 7071068. secundum, quæratut tertium. Id vulgò exquiritur medium in se quadratè multiplicando, & hoc quadratum per primum diuidendo. Sed nos facilius mediæ logarithmum 3465735. duplando, & ab hoc duplo, quod est 6931470. logarithmum primi (qui est 0) auferendo: & ita restat 6931470. logarithmus quaesitus: cuius arcum 30. graduum, & sinum 5000000. (scilicet proportionale quaesitum) iuxta eum inuenies. Sunt ergo 10000000. 7071068. 5000000. tria proportionalia, quorum ultimum sola duplicatione, & subtractione acquisiuimus, quod polliciti sumus. Item duo proportionalia 10562556. primum, & 7660445. secundum, aut saltem eorum logarithmi 547302. & 2665149. dentur. Tertium sic habebis. Ab huius duplo 5330298. aufer — 547302. & (per 8. sect. cap. 4.) producitur logarithmus 5877600. 33. grad. & 45. min. cuius sinus 5555702. est tertium proportionale quaesitum.

## Problema 2.

Ex trium proportionalium logarithmis, datis logarithmis extremis, medium, eiusque proportionale, & arcum per unicam additionem & bipartitionem dare.

Quum per sect. 3. cap. 2. duplum logarithmi mediæ æquetur aggregato extremorum, ideo extremorum logarithmos adde: productum bipartire, & emerget logarithmus mediæ: atque inde medium & mediæ arcus innotescit in columnis, & per sectiones, ut supra.

D

Exem



*Exempli gratia.*

Dentur extrema 1000000 & 5000000. quæratu-  
rum. Id vulgò acquiritur multiplicando data illa inui-  
cem, & producti radicem quadratam extrahendo. Verum  
nos sic facilius. Datos extremorum logarithmos, 0. primi,  
& 6931470. vltimi addimus, & aggregatum 6931470.  
bipartimur, fietque 3465735. optatus medij logarithmus.  
Vnde ipsum medium 7071068, & eius arcus 45. Gr. ratio-  
ne supradicta habentur. Item sint extrema data 10562556.  
& 5555702. eorum logarithmi — 547302. & 5877600.  
Horum additorum summa est 5330298. per sect. 5. cap. 4.  
quam bipartimur, & fit 2665149. logarithmus, & eius ar-  
cus 50. graduum: Et sinus, seu medium proportionale  
quæsitum est 7660445. sola additione, & bipartitione in-  
uentum.

## Problema 3.

*Ex quatuor proportionalium logarithmis, datis tribus, eorumve  
arcubus, inuenire quartum logarithmum, eiusque sinum, & arcum  
per unicam additionem, & subtractionem.*

In hoc problemate quæsitum semper pro quarto sta-  
tuimus, ita vt datorum primum se habeat ad secundum,  
vt tertium ad quæsitum. Quumque ita constitutorum ag-  
gregatum ex logarithmis secundi & tertij minutum lo-  
garithmo primi æquetur quarti logarithmo per 4. sect.  
cap. 2. Ideo logarithmos secundi & tertij adde, & hinc  
aufer logarithmum primi, & proueniet logarithmus quar-  
ti quæsitum: & inde ipsum quartum, & eius arcus.

*Exempli gratia.*

Sit vt 7660445. ad 9848078. ita 5000000. ad quartum.  
quod quærimus. Hoc vulgus acquiritur ducendo secundum  
in tertium, & diuidendo per primum. Tu autem sic faci-  
lius logarithmos secundi 153088. & tertij 6931469. adde,  
fiet 7084557. à quo auferes logarithmum primi, qui est  
2665149, & relinquetur 4419408. logarithmus quarti: cu-  
ius sinus 6427876. est ipsum quartum desideratum, & eius  
arcus est 40. graduum. Idem proueniret si (spretis sini-  
bus

bus) solum darentur tres sui arcus 50. Gra. 80. Gr. & 30.  
Gr. Namque ex logarithmis arcuum 80. Gr. & 30. Gr. abla-  
to logarithmo 50. Gr. remanebit logarithmus 40. Gr. Et  
ita ipse arcus 40. Gr. innotescet absque sinibus, eorumve  
multiplicatione aut diuisione, prout initio polliciti su-  
mus.

*Aliud exemplum.*

**S**it vt tangens seu secundus numerus 43. Gr. ad sinum  
57. Gr. ita secundus seu tangens 35. Gr. ad sinum quar-  
tum tacitum, cuius arcum neglectis & spretis tam sinibus  
quàm tangentibus, sic inueniemus. Logarithmum diffe-  
rentialem 35. Gr. scilicet 3563784. in media columna in-  
uentum ad logarithmum 57. Gr. videlicet 1759372. in  
quiata columna locatum addimus: à producto videlicet  
5323156. differentialem 43. Gr. qui est 698698. subduci-  
mus, & relinquitur 4624458. Logarithmus quarti (sinus  
scilicet) quo in tertia columna per 11. sect. cap. 3. reperto,  
reperies iuxta eum in prima colūna 39. Grad. 2. minut. ferè  
qui est arcus quæsitus quarti proportionalis seu sinus spreti.

Hac ratione proportionalium arcus, absque eorum si-  
nibus, tangentibus, secantibus, aut proportionalibus qui-  
buscunque acquiruntur.

Quod certè compendium ad triangulorum planorum  
angulos dimetiendos, & ad vniuersam sphaericorum Tri-  
gonometriam conducit plurimum: vt suo loco patebit.

## Problema 4.

*Quatuor continuè proportionalium datis extremis eorumve ar-  
cubus, mediorum quodvis, eorumve arcum quemuis inuenire, in-  
ducta simplici tripartitione pro ardua cubica radice extrahitione.*

Quum in horum Logarithmis, triplum cuiusque me-  
dij æquetur aggregato extremi remoti & dupli vicini, per  
prop. 6. cap. 2. Ideo duplum logarithmi extremi alteru-  
trius ad logarithmum extremi reliqui adde, & productum  
tripartire, & proueniet logarithmus medij priori extremo  
proximi, & eodem modo alterum medium. Vt exempli  
gratia: Sint extrema, primum 4029246. vltimum verò



10562556. Quærentur media, quæ absque extractione radicis cubica sic inuenies. Datorum logarithmi sunt 9090051. & — 547302. ad illius duplum 18180102. adde hunc, & fiet 17632800. qui tripartitus producit 5877600. Logarithmum, cuius sinus 5555702, est prius mediū quæsitum. Item simili modo ad huius — 547302. duplum, quod est — 1094604. adde illum 9090051. & producat 7995447. qui tripartitus producit 2665149. Logarithmum, cuius sinus 7560445. est posterius medium etiam quæsitum. Quatuor itaque proportionalia continua sunt 4029246. 5555702. 7660445. & 10562556.

*Aliud exemplum.*

**S**int extrema data 14142135. & 5000000. illius in tabula secantium inuenti logarithmus in tabula nostra est — 3465735. huius verò 5000000. logarithmus est 6931470. cuius duplo 13862940. adde — 3465735. fiet 10397205. quem tripartire, & fit † 3465735. logarithmus medijs proportionalis minori extremo 5000000. proximi, quod est 7071068. Sic duplo — 3465735. quod est — 6931470. adde † 6931470. & fiet inde 0. seu nihil, quod tripartitum etiam reddit 0. cuius sinus & valor est 10000000. pro reliquo & maiore medio. Quatuor itaque hæc continuè proportionalia sunt 12142135. 10000000. 7071068. 5000000.

### CONCLUSIO.

**E**x his prælibatis inducent eruditi quantum emolumenti adferent illis logarithmi: quandoquidem per eorum additionem multiplicatio, per subtractionem diuisio, per bipartitionem extractio quadrata, per tripartitionem cubica, & per alias faciles prosthaphæreses omnia grauiora calculi opera euuantur: cuius rei specimen generale hoc priore libro exhibuimus. Sequentem autem de eorundem proprio & particulari usu in nobili illa Geometria specie, qua Trigonometria dicitur, tractaturi sumus.

FINIS PRIORIS LIBRI.



## LIBER SECVNDVS

# DE CANONIS

## MIRIFICI LOGARITHMORVM

PRÆCLARO VSV IN

Trigonometria.

### CAP. I.



**Q**VVM Geometria sit ars benè metiendi, Dimensio sit magnitudinum propositarum, magnitudines figuram (potentia saltem) constituent, figura sit triangulum, aut triangulatum: Triangulatum verò compositum sit ex triangulis, quibus suisque, partibus mensuratis, mensurabitur & illud, illiusque partes omnes. Certum igitur est ex triangulorum doctrinâ omnis Geometrica quæstionis Solutionem Logisticam pendere.

Triangulum aut rectilineum est, aut Sphericum.

### De Rectilincis, prop. 1.

**R**ectilinei tres anguli æquantur duobus rectis.

Vnde duobus datis, aufer eorum aggregatum ex 180 gradibus, & proueniet tertius. Item vnico ex 180. gradibus ablato, restat reliquorum duorum aggregatum.

Rectilineum aut rectangulum est, obliquangulum.

D 5

In



In rectangulis crura vocamus, quæ rectum angulum ambiunt: hypotenusa, quæ subtendit.

### Propositio 2.

In rectangulo Logarithmus cruris æquatur aggregato ex Logarithmo anguli ei oppositi, & Logarithmo hypotenusa.

Quum ex Trigonometria principiis pateat, alterutrum vis crurum se habere ad sinum anguli ei oppositi, ut hypotenusa ad sinum totum: & (per prop. 5. cap. 2. lib. 1.) horum quatuor proportionalium logarithmi secundi & tertii æquantur logarithmis primi & quarti: quarti autem logarithmus sit 0, seu nihil (per collarium 6. def. cap. 1. lib. 1.) Ideo (ut supra) logarithmus cruris æquatur aggregato ex logarithmo anguli quem subtendit, & logarithmo hypotenusa.

### Corollarium.

Unde hypotenusa, cruris, & anguli quem subtendit, duobus quibusvisque datis, tertium, atque inde in reliquis omnes rectanguli partes innotescunt.



Quia enim hæc tria cum sinu toto constituent quatuor proportionalia, certum est eorum quodvis quarto loco posse constitui, & per 3. probl. cap. 5. lib. 1. acquiri.

Vt trianguli oblati A. B. C. in A rectanguli, detur hypotenusa B. C. 9385, cum crure A B 9384. Quærantur anguli obliqui C. & B. Ex logarithmo igitur A. B. 635870 — 000 aufer logarithmum B. C. 634799 — 000. Superest 1071 logarithmus anguli C, cui in tabula respondent  $89\frac{3}{4}$  pro angulo C. & aduerso 0  $g\frac{1}{4}$  pro eius complemento, angulo scilicet B.

Vice versa si detur angulus C, cum crure recti anguli A. B. & quæraturs hypotenusa B. C.

Ex Logarithmo A. B. 635870 — 000 aufer Logarithmum anguli C. 1071, & prouenient 634799 — 000 Logarithmus B. C. 9385 hypotenusa quæsitæ.

Tertio si datæ B. C. & angulo C. quæraturs A B: adde Logarithmum B. C. 634799 — 000, ad 1071 Logarithmum anguli C., & producentur 635870 — 000 Logarithmus numeri 9384 cruri A. B. quæsitæ respondentis. Nec secus ipsum crurum reliquum A. C. ex angulo B. (qui est complementum anguli C) jam cognito habetur. Atque ita omnes huius rectanguli partes innotescunt.

### Propositio 3.

In rectangulo logarithmus cuiusvis cruris, est æqualis aggregato ex differentiali oppositi anguli, & logarithmo reliqui cruris.

Quum ex vulgari doctrina triangulorum constet, quod alterutrum crurum se habeat ad tangentem sibi oppositi anguli, ut reliquum crurum ad sinum totum: & quum (per prop. 5. cap. 2. lib. 1.) ex his quatuor proportionalibus logarithmi mediorum (id est, differentialis anguli, & logarithmus cruris eum ambientis) æquantur logarithmis cruris eundem subtendentis, & sinus totius (qui est nihil, seu 0.) ideo logarithmus cruris est æqualis aggregato, &c. ut supra.

### Corollarium.

Unde ex cruribus recti, & angulo alteri eorum opposito, duobus quibusvisque datis, tertium (per hanc,) atque proinde cetera omnes rectanguli partes (per præced.) innotescunt.

Quandoquidem hæc tria cum sinu toto constituent quatuor proportionalia, certum est eorum quodvis quarto loco posse collocari, & per 3. probl. cap. 5. lib. 1. acquiri.

Vt præcedentis trianguli A B C, in A rectanguli datis cruribus A B, 9384. & A C, 137. Quæraturs angulus B. Ex Logarithmo A C,





137

Completam ergo habes rectangulorum rectilineorum scientiam: sequitur obliquangulorum.

## DE TRIANGVLIS RECTILINEIS præsertim obliquangulis.

### CAP. II.

#### Propositio 4.

**I**n omni triangulo, aggregatum ex Logarithmis anguli cuiusvis, & lateris eum ambientis, æquatur aggregato ex logarithmis lateris, & anguli eis oppositorum.

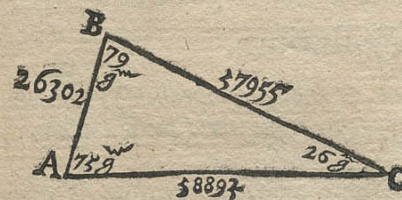
Quia omnium laterum ad oppositorum angulorum finis eadem est ratio: & ita factum ex anguli cuiusvis sinu recto, & latere quouis eum ambiente, æquatur facto ex latere subtendente priorem angulum, & sinu anguli sub-

si à priore latere. Ideo (per prop. 5. cap. 2. i.) aggregatum ex Logarithmis &c. æquatur: vt supra.

#### Corollarium.

Vnde ex duobus angulis quibuscunque data speciei, & suis subtendentibus, si tria dantur, quartum quodcunque, atque inde cetera omnes trianguli partes innotescunt.

Horum enim quatuor proportionalium quodvis quæsitum potest quarto loco constitui, & per 3. probl. cap. 5. lib. 1. inueniri.



Vt obliquanguli A. B.

C detur A. B. 26302, & B.

C. 57955, & angulus C.

26 graduum: Quæratu-

que angulus A, qui sic

habetur. Adde 5454707

— 00 Logarithmum B. C.

ad 8246889 logarithmum scilicet C. 26 graduum, & fient 13701596 — 00. Hinc aufer logarithmum A. B., qui est 13354921 — 00, restant 346675 logarithmus 75 graduum, & paulò plurius, anguli scilicet, A quæsitum, si A prædicatur acutus: alioqui 105 gr. (per 1. & 2. sect. cap. 3. lib. 1.) si pronuncietur obtusus.

Vice versa si detur angulus A jam 75 graduum, atque angulus C. & latus B. C. vt supra: & quæratu- A. B. adde 5454707 — 00 logarithmum B. C. ad 8246889 logarithmum anguli C. fient, vt supra, 13701596 — 00 à quibus aufer 346675 logarithmum anguli A, prouenient 13354921 — 00 logarithmus lateris A. B., & numeri eius 26302 quæsitum. Habitis jam angulis A. 75 gr. & C. 26 gr. erit angulus B. 79 gr. per 1. huius. Ex quo jam habito, non secus acquiratur latus ei oppositum A. C. 58892, quàm nuperrimè ex angulo C. innotuit latus ei oppositum A. B. Itaque jam patent omnes huius obliquanguli partes.

In obliquangulis crura vocamus, quæ angulum quemvis ambiunt: basim quæ subtendit.

#### Propositio 5.

In obliquangulis, logarithmus aggregati crurum subductus à

E

summa



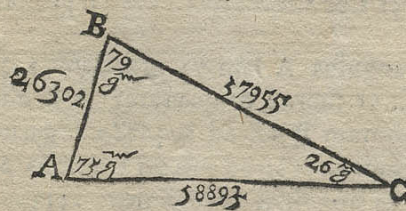
Summa facta ex logarithmo differentia crurum, & differentia semi-aggregati suorum oppositorum angulorum, relinquit differentia semidifferentia eorundem.

Quia, ut aggregatum crurum ad differentiam crurum ita tangens semi-aggregati suorum oppositorum angulorum, se habet ad tangentem semidifferentia eorundem. Unde analoga sunt, & (per prop. 1. cap. 2. lib. 1.) eorundem differentia seu excessus sunt æquales. Necessario igitur (per prop. 4. cap. 2. lib. 1.) concludimus ut supra.

### Corollarium.

Vnde ex duobus cruribus, & angulo comprahenso, innotescunt (per hanc) anguli reliqui oppositi atque inde (per præmissam) reliquum latus.

Nam subducto logarithmo aggregati crurum, à summa facta ex logarithmo differentia crurum, & differentia semi-aggregati oppositorum angulorum additis, proveniet differentialis semidifferentia eorundem angulorum: quæ semidifferentia addita ad semi-aggregatum dictam, proveniet angulus maior, & subtracta minor.

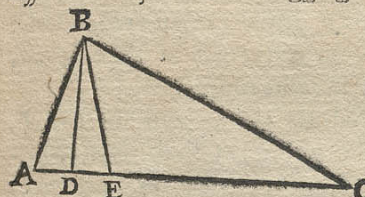


Ut repetiti superius obliquanguli ABC dantur crura, A B. 26302, & B C. 57955, & angulus comprahensus B. 79 graduum. Quærantur autem reliqui anguli A & C. Aggregatum crurum A B. & B C est 84257, eiusque logarithmus est 24738819 — 0. differentia autem eorundem A B, & B C est 31653, eiusque Logarithm. est 34529210 — 0. Quumque B angulus detur 79 graduum erit (per 1. huius) aggregatum angulorum A & C, graduum 101, semi-aggregatum verò 50 graduum 30, cuius differentialis est — 1931766, quo ad 34529210 — 0 addito, fient 32597444 — 0. hinc ablatis 24738819 — 0 provenient 7858625 differentialis graduum 24.30, qui sunt semidifferentia angulorum A & C quæstorum. Hanc ergo semidifferentiam 24.30 adde-

ad semi-aggregatum 59.30, fient 75 gradus, pro angulo A quæstorum maiore, & substrahe eosdem 24.30 gradus ab eisdem 50.30 gradibus, & relinquentur 26 gradus pro angulo B quæstorum minore.

### Definitio.

In obliquangulis vera basis semper est vel aggregatum casuum: & tunc differentia casuum basis alterna vocatur: vel vera basis est differentia casuum: & tunc aggregatum casuum vocamus alternam.



Ut trianguli A B C, casus minor est A D: casus maior est D C. Casuum aggregatum A C est basis vera. Et in hoc triangulo aufer casum minorem A D, seu ei æqualem D E à casu ma-

iore D C, relinquetur differentia casuum E C, quam basim alternam vocamus. Contrà verò in triangulo E B C casus minor est D E (cui æquatur D A) Casus maior est D C, & casuum differentia E C est basis vera. Casuum autem aggregatum, scilicet A C, basim alternam vocamus.

### Propositio 6.

In obliquangulis summa logarithmorum aggregati & differentia crurum, est æqualis summa Logarithmorum basium, vera, & alterna.

Quia basis vera se habet ad aggregatum crurum, ut differentia crurum ad basim alternam: Ideo (per prop. 5. cap. 2. lib. 1.) necessario concludimus, basium logarithmos æquari logarithmis aggregati & differentia crurum, ut supra.

### Corollarium.

Vnde ex obliquangulo datorum laterum, fiunt duo rectangula notarum hypotensarum cum altero cuiusque crure, quæ (per 2. huius) reliquas etiam omnes obliquanguli partes notas reddunt.

Nam addito logarithmo aggregati crurum ad logarithmum differentia crurum, & hinc ablato logarithmo basis vera, proveniet logarithmus basis alterna, per prop. 4. cap. 2. & probl. 3. cap. 5. lib. 1. Harum itaque basium semi-ag-



gregatum est casus maior: semi-differentia verò casus minor. Vt superioris trianguli ABC dentur latera, videlicet crus AB 26302, & crus BC 57955, & basis AC 58892, & querantur cætera. Aggregatum crurum est 84257, eiusque logarithmus est 24738819 — 0. Differentia crurum est 31653, eiusque logarithmus est 34529210 — 0. Hos logarithmos adde, fient inde 59268029 — 00, à quibus aufer 593461 — 00 logarithmum basis AC, restant 53974568 logarithmus numeri 45286 basis alternæ: quam ad veram adde, fient inde 104178, quorum dimidium est 52089, DC, casus maior. Eandem ab eadem aufer, fient inde 13606, quorum dimidium est 6803, A D casus minor.

Rectanguli itaque ADB, habitis jam, hypotenusa AB, & crure altero AD, atque rectanguli BDC habitis, hypotenusa BC, & crure DC, innotescunt (per 2. huius) angulirectangulorum apud A & B & C, & per consequens omnes etiam obliquanguli oblati partes ex præmissis propalantur.

Nec secus agendum foret si darentur latera trianguli EBC, & cæteræ partes querantur. Ex cruribus enim & basi vera EC, innotescit basis alterna AC. atque ex his uterque casus, & cætera, ut supra.

## CONCLUSIO.

**P**erfectam igitur & completam iam habes omnium triangulorum rectilineorum doctrinam, quæ si aliquantulum operosa in Logarithmis rectarum variabilium inveniendis videatur: In motibus tamen planetarum computandis (in quibus scilicet eccentricitates orbium, elongationes Augium & apogæorum, epicyclorum diametri, & alia recta, eadem & invariabiles permanent) eorum logarithmi exactè semel notati, semper in posterum, sine ulla mutatione subseruiunt, miranda certè facilitate, & certitudine.

Sequuntur iam Sphærica triangula, omnium difficillima, ut vulgò ab aliis traduntur, per Logarithmos tamen nostros, omnium facilissima.

DE

## DE TRIANGVLIS SPHÆRICIS.

## CAP. III.

## Sententia I.

**I**n triangulis Sphæricis angulus omnium quadranti quantitas proximus, & latus cum subiendens dubia sunt, An eiusdem, an diuersa sint speciei, nisi id aut computus, aut hypothesis prodar.

2. Duorum vero obliquiorum angulorum quilibet est eiusdem speciei, cuius est latus eum subiendens. Vnde alterius data, reliqui patet speciei.
3. Si trianguli angulus aliquis propinquior sit quadranti, quàm latus eum subiendens, erunt duo eius latera eiusdem speciei, & tertium quadrante minus.
4. Si verò trianguli latus aliquod propinquius sit quadranti, quàm eo subiensus angulus, erunt duo eius anguli eiusdem speciei, & tertius quadrante maior.
5. Triangulum Sphæricum aut est quadrantale, aut non.
6. Quadrantale est cuius aut latus, aut angulus æquatur quadranti. Vnde non rectanguli quadrantalibus scientiam æquè facile, ac rectanguli comparari posse, docemus.
7. Quadrantale triangulum aut est multiplex, aut simplex.
8. Multiplex quadrantale aut est trirectangulum, aut birectangulum.
9. Trirectangulum est cuius singula partes quadranti æquantur.
10. Vnde omne triangulum, cuius trium partium non oppositarum singula quadranti æquantur, Trirectangulum est.
11. Birectangulum est, cuius duo tantum anguli, & sua subiendenda latera singulatim quadranti æquantur.
12. In omni birectangulo angulus obliquus æquator suo subiendenti lateri.
13. Omne Triangulum cuius pars aliqua æquatur quadranti, & angulus aliquis obliquus æquatur suo subiendenti, Birectangulum est.
14. Omne Triangulum habens duas quascunque partes singulatim quadranti æquales, & tertiam inæqualem, Birectangulum est.
15. Cætera quadrantalia simplicia dicuntur.

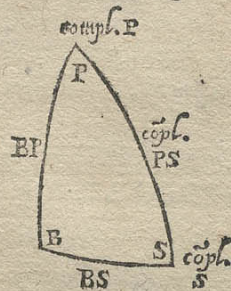
E 3

DE



DE SIMPLICIBVS QVADRANTALIBVS.  
CAP. IV.

1. **Q**uadrantale simplex est, cuius unica tantum pars quadrantale aequatur, cetera autem quinque partes sunt non quadrantes.
2. Harum quinque partium non quadrantium, Tres quae à recto angulo, seu quadrante latere, situ remotiores sunt, in sua complementa convertimus, & retento pristino ordine omnes quinque in circulare, seu pentagonalem situm statuimus, & circulares vocamus.



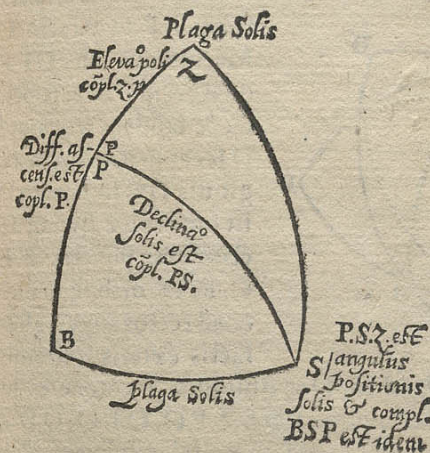
Sit primo triangulum BPS in Bre-  
ctangulum. Eius quinque partes obliquae, seu non quadrantes, sunt hæc. BP latus ambiens rectum. P angulus obliquus alter. PS latus subtendens rectum. S angulus reliquus obliquus. SB reliquum latus ambiens rectum. Pro quibus nos facilioris calculi gratia assumimus latus BP ipsum: complementum anguli P. Complementum lateris PS, complementum anguli S, atque ipsum latus SB, & servato naturali situ has quinque partes ordine statuimus, ut à margine, & circulares vocamus.

Similiter sit secundò triangulum quadrantale simplex, non rectangulum (ex centrâ solis orientis, poli, & zenith factum) SPZ, in latere ZS quadrantale.



Eius quinque partes non quadrantes pristinae sunt. Z angulus alter ambitus à latere quadrante. Latus PZ distantia poli à zenith. P angulus subtensus à quadrante. Latus PS distantia poli à Sole, & angulus denique S alter angulorum quos quadrans ambit. Pro quibus nos ad faciliorem computum nostrum assumimus, ipsum angulum Z, seu PZS, qui est arcus plagæ Solis à septentrione. Complementum PZ, quod est ipsa elevatio poli  
Comple

Complementum anguli P, seu anguli ZPS, quod est differentia ascensionis, id est, differentia temporis ortus vel occasus Solis ab hora sexta. Complementum lateris PS quod est Solis declinatio: & angulum ipsum S seu PSZ, quem angulum positionis Solis, respectu scilicet poli & zenith, vocamus. Has quinque partes etiam circulari vel pentagono situ statuimus, ut à margine, & circulares vocamus. Nec



aliæ fient circulares partes superioris trianguli rectanguli BPS, si P polum, S solem, & B cardinalem borealem seu septentrionalem posuerit. Fient enim latus BP elevatio poli, complementum P differentia ascensionis, Complementum PS declinatio solis, complementum S angulus

positionis solis: ac denique BS plagæ solis. Quæ sunt eadem prorsus circulares partes, quæ supra, & eodem situ leviorum quo ille dextrorsum dispositæ. Et ita in omnibus quadrantibus tam rectangulis, quam non rectangulis.

Corollarium.

3. Hinc fit quod plurima sint triangula in partibus suis naturalibus, haud conformia, quæ in partibus his circularibus prorsus conveniunt, & hac nostra circularium methodo resolvuntur.

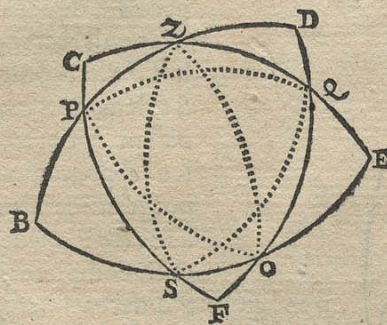
Ut satis lucidè apparet in duobus superioribus triangulis BPS, & PZS coniunctis. In quibus omnes naturales partes (præter PS & BS huius & PS & PZS illius) prorsus differunt: circulares verò partes omnes (ut supra dictum est) conveniunt.

4. Hæc circularium partium uniformitas manifestissime patet in rectan



rectangulis factis in superficie globi ex quinque circulis magnis quorum primus fecit secundum, secundus tertium, tertius quartum, quartus quintum, quintus denique primum ad rectos angulos: reliqua vero sectiones omnes ad angulos obliquos fient.

Exempli gratia: Meridianus regionis D B, secatur horizonem B E in puncto B. Horizon B E secatur circulum E C, qui solem ambit (id est, qui circa solem tanquam polum ducitur) in puncto E. Circulus E C, qui solem ambit, secatur meridianum



solis C F in puncto C. Meridianus solis C F secatur equatorem F D in puncto F: & tandem equator F D secatur meridianum regionis D B in puncto D. Et omnes hae quinque sectiones in punctis B, E, C, F, D orthogonaliter & ad rectos angulos sunt factis ceteris sectionibus

in punctis Z, P, S, O, Q, ad angulos obliquos. Fientque ex his sectionibus rectangula quinque P B S, S F O, O E Q, Q D Z, & Z C P, quorum quamvis partes naturales differant, & in singulis triangulis varientur, circulares tamen quinque partem eadem sunt, quae supra, absque ullo discrimine.

5. Eadem circularium partium uniformitas, patet etiam in quadrantalibus non rectangulis factis in superficie globi ex quinque punctis quorum primus distat à secundo, secundus à tertio, tertius à quarto, quartus à quinto, & quintus à primo distantibus & arcibus aequalibus quadranti, aliae vero punctorum distantiae inaequales sunt quadranti.

Vt in eodem praecedente schemate puncta P à Q, Q à B, B à S, S à Z, Z à O, atque O à P, distant spatiis quadranti aequalibus: at verò P à Z, Z à Q, Q à O, O à S, & S à P, distant arcibus non quadrantibus. Et fient ex his distantiae quadrantalibus non rectangula quinque, P Z Q, Z Q O, Q O S, O S P, & S P Z: quorum quamvis naturales partes differant, partes tamen circulares eadem & immutabiles hinc permixtae sunt, quae supra. Scilicet, eleuatio poli, differentia ascensionis

lis, declinatio solis, angulus positionis solis, & plaga solis: quae omnibus superioribus triangulis ex aequo conueniunt, nec his duntaxat solis, verum etiam omnibus triangulis quae oriuntur ex intersectionibus ceteris horum decem arcuum ad integros circulos productorum: quae, quia plurima & confusa sunt, misce hic facimus. Hac epitome satis est monuisse omnem confusionem naturalium partium, & suarum regularum, his paucis circularibus partibus & sua regula vnica euitari, ac tolli.

6. Quinque circularium partium, tres semper in quaestionem cadunt, quarum duae dantur, tertia quaeritur.

7. Atque harum trium vna est intermedia, & duae sunt extremae, quae scilicet intermedia aut circumponuntur, aut opponuntur.

Verbi gratia, Sint partes tres in quaestione proposita hae, plaga solis, eleuatio poli, & differentia ascensionalis: quarum, eleuatio poli pars intermedia dicitur, & reliquae duae extremae ei vicinae, aut circumpositae vocantur: verum si tres partes in quaestionem cadentes forent, declinatio solis, eleuatio poli, & angulus positionis solis, vocabitur (vt prius) eleuatio poli intermedia: sed declinatio solis, & angulus positionis solis, extremae à media remotae, seu ei oppositae dicentur: Par ratio est in reliquis quinque.

8. Logarithmus intermediae aequatur differentialibus circumpositarum extremarum, seu antilogarithmis oppositarum extremarum.

Hoc theorema probatur inductione omnium trium partium seu triplicitatum, quae ex quinque circularibus partibus quadrantalibus prioris B P S rectanguli, constitui possunt, & in quaestionem cadere: posterioris autem non rectanguli P Z S triplicitates omittimus, quia eius omnes partes circulares (ex 18, & 19, & 20 praemissis) eadem prorsus sunt quantitate, quae prioris. Quinque ergo partium circularium rectanguli B P S, (quae sunt B S, seu plaga solis orientis: complementum B S P, seu angulus positionis solis: complementum S P, seu declinatio solis: complementum S P B, seu differentia ascensionalis: & P B, seu eleuatio poli) tres illae quae in quaestionem extremarum circumpositarum cadunt, sunt aut primò B S, complementum B S P, & complementum S P: aut secundò complementum B S P, complementum S P: & comple-



mentum  $SPB$ : aut tertio complementum  $SP$ , complementum  $SPB$ , &  $PB$ : aut quarto complementum  $SPB$ ,  $PB$ , &  $BS$ : aut quinto sunt  $PB$ ,  $BS$ , & complementum  $BS P$ .

Verum quia in omnibus his triplicitatibus, Tangens alterius extremæ est ad sinum rectum intermediæ, ut sinus totus ad tangentem reliquæ extremæ (pro ut ex vulgaribus demonstrationibus Trigonometriæ patet.) Ideo (per nostras demonstrationes prop. 5. cap. 2. lib. 1.) Logarithmi mediarum (qui sunt logarithmus solius intermediæ per corollarium 6. def. cap. 1. lib. 1.) æquantur logarithmis tangentium utriusque extremæ. Sed Logarithmi tangentium harum extremarum sunt differentiales earundem (ex sect. 22. & 25. cap. 3. lib. 1.) Logarithmus igitur solius intermediæ æquatur differentialibus circumpositarum extremarum, ut priore parte Theorematis asseruimus. Sequitur posterioris partis confirmatio.

Earundem ergo quinque partium circularium, tres illæ quæ in quæstionem extremarum intermediæ oppositarum cadunt, sunt aut primò  $PB$ , complementum  $BS P$ , & complementum  $SP B$ : aut secundo  $BS$ , complementum  $SP$ , &  $PB$ : aut tertio complementum  $BS P$ , complementum  $SP B$ , &  $BS$ : aut quarto complementum  $SP$ ,  $PB$ , & complementum  $BS P$ : aut quinto denique complementum  $SP B$ ,  $BS$ , & complementum  $SP$ .

Sed in omnibus his triplicitatibus seu quinque casibus, sinus rectus complementi alterius extremæ se habet ad sinum rectum intermediæ, ut sinus totus ad sinum rectum complementi reliquæ extremæ (quod fusiùs à Regiomontano, Copernico, Lansbergio, Pitisco, & aliis demonstratur, quam ut breui hac epitome reperendum sit) Ideo per nostras demonstrationes (prop. 5. cap. 2. lib. 1.) Logarithmi complementorum harum extremarum æquantur logarithmis mediarum, id est, (ut dictum est) logarithmo solius intermediæ. At Logarithmi complementorum harum extremarum oppositarum sunt earundem ipsarum partium antilogarithmi (ex def. sect. 13. & 16. cap. 3. lib. 1.) sequitur ergo in his casibus, quod logarithmus solius intermediæ æquetur antilogarithmis suarum extremarum oppositarum, ut asserit posterior theorematis pars

tis pars

tis pars. Totum itaque theorema constat. Præter hanc probationem per inductionem omnium casuum, qui occurrere possunt, potest idem theorema lucidè perspicui ex 19<sup>a</sup> & 20<sup>a</sup> præcedentibus, in quorum schemate, homologa circularium partium constitutio earundem analogiæ similitudinem arguit: ita ut quod de vna intermediæ & suis extremis circumpositis, aut oppositis verè enuntiatur, de cæteris quatuor intermediis & suis extremis respectuè circumpositis, aut oppositis negari non possit.

## PORISMA GENERALE.

9. **H**inc sequitur in quadrantalibus simplicibus, quod ex duabus partibus quibuscunque datis tertia quævis innotescet. Semper enim aut intermedia queritur, & eius logarithmus habetur addendo differentiales circumpositarum extremarum datarum: aut altera extremarum queritur, & eius differentialis emergit ex subtractione differentialis reliquæ extremæ datæ à Logarithmo intermediæ notæ: ut in quinque prioribus triplicitatibus rectanguli præcedentis theorematis, & totidem non rectanguli: aut intermedia queritur, & eius logarithmus provenit, addendo antilogarithmos oppositarum extremarum datarum: aut denique altera extremarum oppositarum queritur: & eius antilogarithmus ex subductione antilogarithmi reliquæ extremæ oppositæ datæ ex logarithmo intermediæ notæ habetur. Ut in quinque posterioribus casibus rectanguli præcedentis theorematis, & totidem non rectanguli. Horum autem Logarithmorum, antilogarithmorum, & differentialium iam inuentorum cuiuslibet respondet duo arcus diuersarum specierum. Ex specie igitur quæsitæ arcus per secundam, tertiam, quartam huius, aut per hypothesin notæ, ipse arcus verè innotescet.

Ut in priore exemplo septimæ, Tres quæstionis partes circulares sunt, plaga solis, elevatio poli, & differentia ascensionalis, id est, In rectangulo  $BPS$ , partes  $BS$ ,  $PB$ , & complementum  $SPB$ : vel in non rectangulo quadrantali  $PZS$ , partes  $PZ$ ,  $PS$ , & complementum  $SPZ$ : quarum trium dentur extremæ circumpositæ, scilicet plaga solis orientis  $BS$ , vel  $PZS$ , 70 Gr. & differentia ascensionalis com-

E 2

ple



plementum S P B, vel complementum S P Z, 16 Gr. 24, 27: & quærat in intermedia pars P. B, vel complementum P Z, quæ est eleuatio poli. Addatur ergo differentialis 70. Gr., viz. — 10106827 ad differentialem 16 gr. 24. 27. videlicet ad 12226180. & prouenient 2119353. Logarithmus 54. graduum pro eleuatione poli quæsitæ.

## ADMONITIO.

**P** Ræter eleuationem poli hoc modo inuentam, habetur etiam secundò eadem praxi plaga solis ex eleuatione poli, & angulo positionis solis. Item tertio angulus positionis solis ex plaga solis, & eiusdem declinatione datis. Quarto declinatio solis ex angulo positionis solis, & differentia ascensionali. Quintò differentia ascensionalis ex declinatione solis, & eleuatione poli.

## Secundum exemplum.

**D** Etur plaga solis orientis B S, seu P. Z. S, 70. graduum: & eleuatio poli 54 graduum, quæ est P. B, aut complementum P. Z. Quærat autem differentia ascensionalis, scilicet complementum S. P. B, vel complementum S. P. Z. Et, quia hic similiter extremæ partes circumponuntur intermedia, ergo aufer differentialem plagæ solis seu 70. graduum, qui est — 10106827. ex logarithmo eleuationis poli 54. graduum, scilicet ex 2119353: & prouenient inde 12226180. differentialis graduum 16. 24 27 ferè, arcus differentia ascensionalis quæsitæ.

## ADMONITIO.

**A** D huius exempli imitationem habetur scundò declinatio solis ex differentia ascensionali, & eleuatione poli datis. Item tertio angulus positionis solis ex declinatione solis, & differentia ascensionali. Quarto plaga solis ex angulo positionis solis, & declinatione eiusdem. Quintò eleuatio poli habetur ex plaga solis, & angulo positionis solis. Item contrà habetur. Sextò differentia ascensionalis ex declinatione solis,

solis, & angulo positionis solis datis. Septimò declinatio solis ex angulo positionis solis, & plaga eius. Octauò angulus positionis solis habetur ex plaga solis & eleuatione poli datis. Nonò plaga solis ex eleuatione poli, & differentia ascensionali. Decimò tandem eleuatio poli habetur ex differentia ascensionali, & declinatione solis datis.

## Tertium exemplum.

**I** N posteriore exemplo eiusdem septimæ tres quæstionis partes circulares proponuntur hæc, declinatio solis, eleuatio poli, & angulus positionis solis. Eæ sunt in rectangulo B. P. S. complementum P S B P. & complementum B S P, & in non rectangulo quadranti P. Z. S, eæ sunt, complementum P. S. complementum Z. P. & Z. S. P. Quarum trium dentur extremæ oppositæ, scilicet declinatio solis, quæ est complementum P. S. 11. grad. 35. 51', & angulus positionis solis, qui est complementum B. S. P, seu Z. S. P. 34 grad. 19. 21' ferè. Et quærat in intermedia pars B. P, seu complementum Z P, quæ est eleuatio poli. Addatur ergo antilogarithmus 11. grad. 35. 51', qui est 206271 ad antilogarithmum 34. grad. 19. 21', qui est 1913082 prouenient 2119353. Logarithmus 54. graduum pro eleuatione poli quæsitæ.

## ADMONITIO.

**P** Ræter eleuationem poli hoc jam modo inuentam, poteris secundò per eandem praxim habere plagam solis ex eiusdem declinatione, & differentia ascensionali datis. Tertio angulum positionis solis ex differentia ascensionali & eleuatione poli. Quarto declinationem solis ex eleuatione poli, & plaga solis. Et quintò inuenies differentiam ascensionalem ex plaga solis & angulo positionis solis datis.

## Quartum exemplum.

**D** Etur declinatio solis complementum S. P. 11. graduum 35. 51', & eleuatio poli B. P. seu complementum P. Z graduum 54. Quærat autem angulus positionis solis complementum



mentum B.S.P, seu P, S, Z: & quia hic similiter extremæ partes intermediae opponuntur igitur auferendus erit antilogarithmus 11. graduum 35. 51', qui est 206271. ex logarithmo 54. graduum, qui est 2119353. & supererunt 1913082. antilogarithmus 34. graduum 19. 21' fore, qui sunt angulus positionis solis quæsitus.

## ADMONITIO.

**P**Ræter angulum positionis solis ac prima praxi acquiritur, habetur secundò eadem praxi declinatio solis ex datis differentia ascensionali & plaga solis. Tertiò habetur differentia ascensionalis ex datis eleuatione poli & angulo positionis solis. Quartò eleuatio poli inuenitur ex plaga solis & eiusdem declinatione datis. Quintò plaga solis acquiritur ex angulo positionis solis & differentia ascensionali. Sextò (contrario ordine) angulus positionis solis inuenitur ex plaga solis & differentia ascensionali datis. Septimò declinatio solis habetur ex angulo positionis solis, & eleuatione poli datis. Octauò differentia ascensionalis ex declinatione solis, & eiusdem plaga inuenitur. Nonò eleuatio poli habetur ex data differentia ascensionali, & angulo positionis solis. Decimò tandem acquiritur plaga solis, ex eleuatione poli, & declinatione solis datis.

Atque ita ad imitationem horum quatuor exemplorum, triginta variæ soluuntur quæstiones circularium partium, hoc est, triginta variæ quæstiones in quadrantalibus reſtángulo, & totidem in non reſtángulo soluuntur hoc porismate, beneficio vnus tantummodo additionis vel subtractionis. Cæterum ad intelligentiam posterioris partis huius porismatis, de arcuum speciebus, vide exempla, (tertium, quartum, quintum, & sextum) sequentia.

DE

DE NON QUADRANTALIBVS  
mixtis.

## CAP. V.

**H**ælenus quadrantalium, sequitur triangulorum Sphericorum non quadrantalium doctrina.

1. Non quadrantale est triangulum Sphericum, cuius nec latus, nec angulus quadrans est.
2. Non quadrantale reducitur ad bina quadrantalia, Si à vertice ad eius basim (prout opus fuerit extensam) dimittatur perpendicularis, aut quadrans arcus.
3. Perpendicularis cadu inira triangulum, si anguli apud basim sint eiusdem speciei: extra verò si diuersæ: & contrà.
4. Quadrans arcus cadu extra triangulum, si crura sint eiusdem speciei. Intra verò si diuersæ: & contrà.
5. Ex non quadrantalibus sex partibus, tres data solùm sufficiunt ad reliquarum scientiam comparandam: nisi forsitan trium datarum, quarum una alteri opponatur, tertia sit propinquior quadranti, quam altera eiusdem generis data. In hoc enim casu requiritur etiam dari species parius qua tertia opponitur, ut reliquæ sciantur.

Huius casus exempla sunt, quartum & sextum exemplum sequentium.

6. Partes tres datae aut miscellaneæ sunt, aut puræ.
7. Miscellaneæ sunt, quarum una est diuersi generis à reliquis duabus.

Vt cum dantur duo latera, & angulus aliquis: aut duo anguli cum latere aliquo.

8. In partibus miscellaneis datis, si ab illo termino lateris dati in cuius reliquo termino sit angulus datus, cadat ad basim perpendicularis, aut quadrans datum illum angulum subiendens, reducitur non quadrantale ad bina quadrantalia (per nonam sect. cap. 4. huius) solibilia.

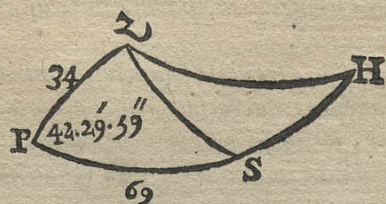
Vnde & non quadrantalibus partes (quia cum horum quadrantalium partibus, aut partium reliquis communes sunt) facile innotescunt,



cunt, cognitis tamen prius per 2. 3. & 4. sect. cap. 3. huius, aut ex hypothesi parium speciebus.

EXEMPLVM DVORVM LATERV, & anguli interpositi datorum.

VT sit (vltus & exercitij gratia) triangulum Sphaericum non quadrantale in superficie primi mobilis descriptum P. Z. S. polum, Zenith, & Co-lem referens: cuius sex partes sunt, latus P. Z. quod est interstitium poli & Zenith, seu complementum eleuationis poli. Latus Z. S. interstitium Zenith & solis, seu complementum altitudinis solis.



Latus P. S. interstitium poli & solis, seu complementum declinationis solis ab æquatore. Angulus Z. P. S. hora diei, seu tempora horaria æquatoris. Angulus P. Z. S. quæ plaga est, seu

azimuth solis à septentrione. Angulus P. S. Z, qui angulus est situs & positionis solis ad polum & zenith. Harum sex partium dantur tres quæcunque mistellaneæ. Verbi gratia, angulus horarius Z. P. S. 42. 29. 59. (qui horam secundam 49. 59. 38. pomeridianam notat) & latus P. Z. 34. complementum eleuationis poli: atque latus P. S. 69. complementum declinationis solis. Ex quibus, vt acquirantur tres reliquæ partes, ab. Z. termino lateris P. Z. dati, dimittatur perpendicularis Z. M. aut, si mauis, quadrans Z. H. angulum datum Z. P. S. subtendens, reducentque non quadrantale oblatum P. Z. S. ad duo triangula in angulo M. quadrantalia, quæ sunt P. M. Z. & Z. M. S. vt in primo schemate: vel (si varietate delecteris) ad duo triangula in latere Z. H. quadrantalia, quæ sunt Z. H. P. & Z. H. S. vt in secundo schemate: Quorum qua-

quadrantalium omnes partes per 9. sect. cap. 4. huius acquires. Nam ex datis P. Z. 34. atque Z. P. M. seu Z. P. S. 42. 29. 59. inuenies perpendicularem Z. M. 22. 11. 47. & angulum P. Z. M. 52. 46. 38. & latus P. M. 26. 26. 29. quo ablato à P. S. 69. restat M. S. 42. 33. 31. quo & perpendiculari Z. M. jam cognitis, inuenies per 9. sect. cap. 4. huius angulum M. S. Z. seu quæsitum P. S. Z. 31. 65. & latus quæsitum S. Z. 47. atque angulum M. Z. S. 67. 38. 11. quo ad P. Z. M. 52. 46. 38. addito, fit angulus reliquus quæsitus P. Z. S. 120. 24. 49. Tres itaque habes partes quæsitæ officio perpendicularis Z. M. primi schematis. Eadem quoque officio quadrantis Z. H. secundi schematis venari poteris. Ex datis enim, vt supra, P. Z. 34. & Z. P. S. seu Z. P. H. 42. 29. 59. inuenies per eandem 9. cap. 4. huius, angulum Z. H. P. 22. 11. 47. & angulum P. Z. H. 142. 46. 38. & latus P. H. 116. 26. 29. ex quo aufer P. S. 69. restat S. H. 47. 26. 29. quo & angulo apud H. 22. 11. 47. jam habitis, inuenies per 9. cap. 4. huius, angulum H. S. Z. 148. 53. 15. eiusque ad semicirculum reliquum scilicet 31. 6. 5. angulum P. S. Z. quæsitum: atque latus quæsitum S. Z. 47. Denique angulum H. Z. S. 22. 21. 49. quo ex H. Z. P. 142. 46. 38. ablato, restat angulus reliquus quæsitus P. Z. S. 120. 24. 49. prorsus vt supra.

AD MONITIO.

Huius exempli imitatione nouem variæ soluantur huius & cuiusque trianguli quæstiones. Ex datis enim eleuatione poli, hora diei, & declinatione solis illius diei, habetur (vt supra) primò azimuth seu plaga solis, secundò altitudo solis, Tertio angulus positionis solis. Item datis declinatione solis, angulo positionis solis, & altitudine solis, habetur quartò plaga solis, quintò eleuatio poli, sextò hora, seu arcus horarius. Item datis altitudine solis, plaga solis, & eleuatione poli, habetur septimò hora diei, octauò declinatio solis, nonò denique angulus positionis solis.

Secundum



*Secundum exemplum duorum angulorum, & lateris  
interpositi, datorum.*

**P**recedentium schematum datis angulis, horario scilicet Z.P.S. 42. 29. 59. & plagæ solis P.Z.S. 120. 24. 49. cum complemento eleuationis poli, latere scilicet interposito P.Z. 34. Tres ceteræ partes exquiruntur. Nam habitis primò (ut supra) Z.M. 22. 11. 47. & P.M. 26. 26. 29. & angulo P.Z.M. 52. 46. 38. quo ex P.Z.S. 120. 24. 49. ablato reliquoque angulo M.Z.S. 67. 38. 11. ex hoc atque Z.M. jam notis, inuenientur tandem latus quæsitum Z.S. 47. & Z.S.M. siue angulus quæsitus Z.S.P. 31. 6. 5. atque M.S. 42. 33. 31. quo ad P.M. addito, fit reliquum latus quæsitum P.S. 69. Hasque beneficio perpendicularis primi schematis habes, nec secus eadem officio quadrantis secundi schematis acquirere poteris: acquiruntur enim (per nonam quarti huius) ex datis, anguli P.H.Z. & P.Z.H. & ex hoc subducto P.Z.S. dato, restat S.Z.H. quo, & angulo P.H.Z. jam notis propalantur ceteræ omnes partes.

#### ADMONITIO.

**H**uius exempli imitatione nouem variæ soluuntur huius, & cuiusque trianguli quæstiones. Ex datis enim (ut supra) hora diei, eleuatione poli, & plagæ solis, habetur primò declinatio solis. Secundò angulus positionis solis, tertio altitudo solis. Item datis hora diei, declinatione solis, & angulo positionis solis, habetur quartò altitudo solis, quintò plagæ solis, sextò eleuatio poli. Item datis angulo positionis solis, altitudine solis, & plagæ solis acquiritur septimò eleuatio poli octauo hora diei, nono declinatio solis.

*Tertium*

*Tertium exemplum duorum datorum laterum, quorum quadrantis  
propinquius subtendit angulum datum.*

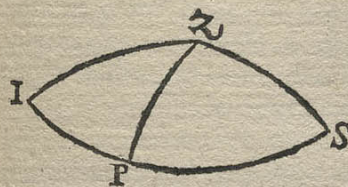
**P**recedentium schematum dentur latera P. Z. 34. & eo quadrantis propinquius Z.S. 47. cum eo quem hoc subtendit angulo Z.P.S. 42. 26. 59. acquirantur per 9. sect. cap. 4. huius Z.M. 22. 11. 47. & P.Z.M. 52. 46. 38. & P.M. 26. 26. 29. & simili modo habebis Z.S.M. seu quæsitum angulum Z.S.P. certissimè enim scitur hic per 2. sent. cap. 3. huius, minor quadrante, scilicet esse 31. 6. 5. & non esse 148. 53. 59. Habebis etiam angulum M.Z.S. 67. 38. 11. quo ad P.Z.M. 52. 46. 38. addito, fit reliquus quæsitus angulus P.Z.S. 120. 24. 49. Habebis denique & M.S. 42. 33. 31. quo ad P.M. 26. 26. 29. addito, fit quæsitum latus P.S. 69. Nec secus eadem acquirere poteris (si libet) officio quadrantis Z.H. secundi schematis.

*Quartum exemplum duorum datorum laterum, quorum quadrantis  
minus propinquum subtendit angulum datum: magis an-  
tem propinquum subtendit angulum data-  
tantum speciei.*

**D**entur latera Z.S. 47. & eo quadrantis minus propinquum P.Z. 34. cum eo quem hoc subtendit angulo Z.S.P. 31. 6. 5. deturque quod quem Z.S. subtendit (angulus scilicet S.P.Z.) fit specie minor quadrante: Dimisso itaque ab Z. ad basim P.S. perpendiculari Z.M. (ut prius) aut quadrante Z.I. (ut hic) subtendente angulum datum Z.S.P. Acquirantur per 9. sect.

4. huius ceteræ partes, ut (exerciti & varietatis gratiâ) ex huius schematis quadrante Z.I. acquirens angulum Z.I.S. 22. 11. 47. & I.Z.S. 157. 36. 11. Et S.I.Z. 2. 33. 31. & simili modo habebis angulum I.P.Z. & per consequens angulum quæsitum S.P.Z. 42. 26. 59. Quia ex hypothesis expresse quadrante minor

G 2 decla





declaratur, alioquin nisi eius daretur species, foret (ex prima cap. 3. & quinta sect. huius cap.) incertus: potuit enim aliter fuisse 137. 36. 1. Habebis etiam sic angulum I. Z. P. 37. 13. 22. quo ex I. Z. S. 157. 38. 11. ablato, relinquitur reliquus quadrantalibus angulus P. Z. S. 120. 24. 49. Habebis denique & I. P. 63. 33. 31. quo ex I. S. 132. 33. 31. ablato, remanet quadrantalibus latus P. S. 69. Eadem etiam metas attinges si beneficio perpendicularis Z. M. primi schematis, partium logistice quadraveris.

## ADMONITIO.

**P**recedentis tertij & huius quarti exemplorum imitatione, octodecim varia solvuntur huius & cuiusque trianguli quaestiones. Ex datis enim (ut in tertio exemplo) elevatione poli, altitudine solis, & hora diei, habetur primò plaga solis, secundò angulus positionis solis, tertio declinatio solis. Item datis (ut in hoc quarto exemplo) elevatione poli, altitudine solis, & angulo positionis solis, habetur quartò plaga solis, quinto hora diei, sexto declinatio solis. Item datis altitudine solis, declinatione solis, & hora diei, habetur septimò angulus positionis solis, octavò plaga solis, nonò elevatio poli. Item datis altitudine solis, declinatione solis, & plaga solis, habetur decimò angulus positionis solis, undecimò hora diei, duodecimò elevatio poli. Item datis declinatione solis, elevatione poli, & angulo positionis solis, habetur decimotertio plaga solis, decimoquarto altitudo solis, decimoquinto hora diei. Item datis declinatione solis, elevatione poli, & plaga solis habetur decimosextò hora diei, decimosseptimò angulus positionis solis, & decimo-octavò altitudo solis.

*Quintum exemplum duorum datorum angulorum, quorum quadranti propinquior latus datum subindit.*

**T**rianguli P. Z. S. primi schematis, dentur anguli P. S. Z. 31. 6. 5. & eo quadranti propinquior S. P. Z. 42. 29. 59. cum latere Z. S. 47 hunc subtendente. Ex quibus P. S. Z. & S. Z. habetur (per nonam quarti huius) perpendicularis Z. M. 22. 11. 47. &

& ceteræ partes quadrantalibus S. Z. M. scilicet M. Z. S. 67. 38. 11. & M. S. 42. 33. 31. Sicut & ex perpendiculari hoc cum dato Z. P. S. seu Z. P. M. angulo, habentur partes omnes quadrantalibus Z. M. P. Scilicet primò latus quadratum P. Z. certissime enim scitur hoc (per 2. sentent. cap. 3. huius) minus quadrante, videlicet esse 34. non autem esse 146. Deinde habetur P. Z. M. 52. 46. 38. quo ad S. Z. M. 67. 38. 11. addito, fit quadrantalibus angulus P. Z. S. 120. 24. 49. Ultimò habetur P. M. 26. 26. 29. quo ad M. S. 42. 33. 31. addito, fit reliquum latus quadratum P. S. 69. Has etiam ipsas partes aliter (si mauis) ex duobus proximè precedentis Schematis quadrantalibus Z. I. S. & Z. I. P. acquirere poteris.

*Sextum exemplum duorum datorum angulorum, quorum quadranti minus propinquum subindit latus datum, magis autem propinquum subindit latus data tantum speciri.*

**T**rianguli P. Z. S. primi Schematis dentur anguli Z. P. S. 42. 29. 59. & eo quadranti minus propinquus Z. S. P. 31. 6. 5. cum eum subtendere latere P. Z. 34. Deturque quod angulum Z. P. S. subtendens, (scilicet latus Z. S.) sit specie minus quadrante. Ex his datis quadratur perpendicularis Z. M. 22. 11. 47. & ceteræ quadrantalibus P. Z. M. partes, scilicet P. Z. M. 52. 46. 38. & P. M. 26. 26. 29. Sicut & ex perpendiculari hoc cum dato Z. S. M. seu Z. S. P. 31. 6. 5. querantur partes omnes quadrantalibus Z. M. S. scilicet primò latus optatum Z. S. 47. quia ex hypothesei expresse quadrante minus declarantur, alioquin potuit fuisse 133. Nam (per 1. cap. 3. & quintam huius) incertum est nisi eius expresse detur species. Deinde angulus M. Z. S. 67. 38. 11. quo ad M. Z. P. 52. 46. 38. addito fit optatus angulus P. Z. S. 120. 24. 49. Denique habetur S. M. 42. 33. 31. Quo ad P. M. 26. 26. 29. addito, fit optata basis P. S. 69. Eadem etiam partes ex duobus quadrantalibus P. H. Z. & S. H. Z. secundi schematis, quam facillimè acquirere poteris.



## ADMONITIO.

**P**recedentis quinti & huius sexti exemplorum imitatio. ne, octodecim variae solvuntur huius, & cuiusque triangulari quaestiones. Ex datis enim (ut in quinto exemplo) angulo positionis solis, hora diei, & altitudine solis, habetur primo eleuatio poli, secundo plaga solis, tertio declinatio solis. Item datis (ut in hoc sexto exemplo) hora diei, angulo positionis solis, & eleuatione poli, habetur quarto altitudo solis, quinto plaga solis, sexto declinatio solis. Item datis hora diei, plaga solis, & altitudine solis, habetur septimo declinatio solis, octauo angulus positionis solis, nono eleuatio poli. Item datis hora diei, plaga solis, & declinatione solis, habetur decimo altitudo solis, undecimo angulus positionis solis, duodecimo eleuatio poli. Item datis plaga solis, angulo positionis solis, & declinatione solis, habetur decimotertio eleuatio poli, decimoquarto hora diei, decimoquinto altitudo solis. Item datis plaga solis, angulo positionis solis, & eleuatione poli, habetur decimosexto declinatio solis, decimosseptimo hora diei, decimo-octauo altitudo solis. Atque ita huius solius canonis methodo, quinquaginta quatuor variae solvuntur quaestiones eiusdem trianguli non quadrantalibus. Ceterae inferius soluentur.

9. Ex his itaque patet quod duorum angulorum & suorum subtendentium laterum tribus datis, quarti saltem Logarithmus innotescet, circa etiam quadrantalium descriptione. Ab aggregato enim ex Logarithmis anguli & lateris sibi adiacentis datorum, aufer Logarithmum tertij dati, & proueniet inde Logarithmus quarti quaesiti, ipsumque quartum, nisi sit incerta speciei, innotescet.

Ut ex superioribus tertio, quarto, quinto, & sexto exemplis percipi potest. Angulorum enim basis Z. P. S. & Z. S. P. & suorum subtendentium crurum Z. S. & Z. P. dentur tria, quae (verbi gratia) sint crura Z. S. 47, eiusque Logarithmus 3128580, & Z. P. 34, eiusque logarithmus 5812606, cum huic adiacente angulo Z. P. S. 42. 29. 59. cuius Logarithmum 3921720 adde ad 5812606, fit 9734326 (Logarithmus scilicet

raciti

raciti & suppressi perpendicularis Z. M. vel anguli Z. H. S. seu Z. I. P.) à quo aufer 3128580 remanet 6605746 Logarithmus quarti Z. S. P. quaesiti. Ipsum itaque quartum Z. S. P. erit 31. 6. 3. Quoniam per 2. sect. cap. 3. minus quadrante arguitur. Contra autem datis Z. P. 34. eiusque Logarithmo 5812606. & Z. S. 47. eiusque Logarithmo 3128580, cum huic adiacente angulo Z. S. P. 31. 6. 3. ad cuius logarithmum 6605746, adde 3128580, fit aggregatum (ut supra) 9734326. à quo aufer 5812606, proueniet 3921720 Logarithmus quarti quaesiti, scilicet Z. P. S. cuius arcus per 1. sect. cap. 3. incertus est an sit 42. 29. 59. an 137. 36. 1. nisi declaret hypothesis maiorne, an minor sit quadrante.

DE NON QUADRANTALIBVS  
purs.

## CAP. VI.

**H**actenus de partibus miscellaneis datis: Sequuntur purae.

1. Purae sunt tres partes eiusdem generis datae. Suntque aut tria latera data, & quaruntur anguli: aut tres anguli dati, & quaruntur latera.

## ADMONITIO.

2. Prae quamvis simplicitate priores, ob difficultatem tamen earundem merito hic posteriorem sortimur locum.

3. In triangulis Sphaericis primo summa ex Logarithmis crurum subducta à summa ex Logarithmis aggregati & differentia semibasis & semidifferentia crurum, relinquit duplum Logarithmi dimidij anguli verticalis.

Quia



Quia docent Regionontanus libro 5. cap. 2. de triangulis, & alij, ut rectangulum comprehensum sub sinibus rectis crurum, se habet ad quadratum sinus totius: Ita differentiam sinuum versorum basis & differentia crurum se habere ad sinum versum anguli verticalis: quum autem ut illa differentia ad hunc sinum versum, ita rectangulum factum ex sinibus rectis aggregati & differentia semibasis & semidifferentia crurum, se habet ad quadratum sinus recti dimidij anguli verticalis (est enim novissimum hoc rectangulum ad illam differentiam sinuum versorum, & hoc ultimum quadratum ad illum sinum versum in ratione 5000000<sup>cupla</sup>, & intellige quinquies millies millecupla, existente sinu toto 10000000.) Ideo sequetur quod, ut rectangulum sub sinibus rectis crurum se habet ad quadratum sinus totius, ita rectangulum factum ex sinibus rectis aggregati & differentia semibasis & semidifferentia crurum, se habebit ad quadratum sinus recti dimidij anguli verticalis & per consequens (ex corol. def. 6. cap. 1. & prop. 4. cap. 2. & probl. 3. cap. 5. lib. 1.) Summa ex Logarithmis crurum, subducta ex Logarithmis aggregati & differentia semibasis & semidifferentia crurum, relinquit duplum Logarithmi dimidij anguli verticalis, ut supra.

4. *Secundo, Summa ex Logarithmis crurum subducta à summa ex Logarithmis aggregati & differentia semibasis & semidifferentia crurum, relinquit duplum antilogarithmi dimidij anguli verticalis.*

Non enim aliter se habet summa ex Logarithmis aggregati & differentia semibasis & semidifferentia crurum huius propositionis, ad summam ex Logarithmis aggregati & differentia semibasis & semidifferentia crurum precedentis propositionis, quam duplum antilogarithmi dimidij anguli verticalis hic, ad duplum logarithmi eiusdem dimidij anguli verticalis superius, quod alterius loci est demonstrare.

AD MO

ADMONITIO.

1. *IN Sphericis etiam, bases veram & alteram, eodem sensu capimus, quo in rectilineis, nimirum alteram pro aggregato, alteram pro differentia casuum.*

6. *Tercio differentialis semibasis vera data, subductus ex summa differentialium semiaggregato & semidifferentia crurum, relinquit differentialis semibasis altera.*

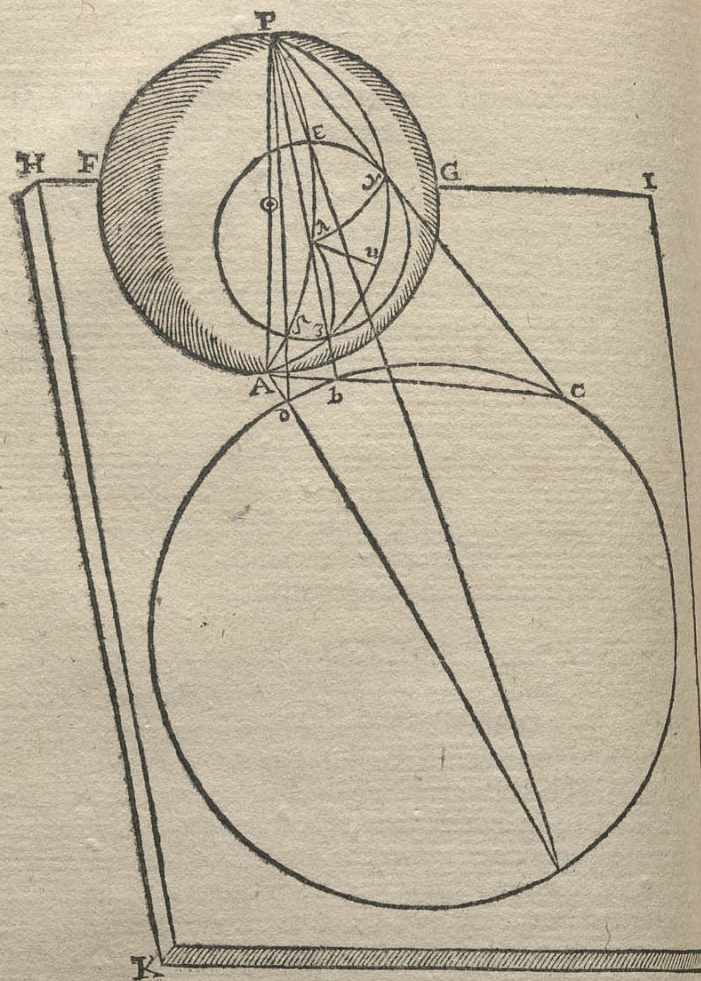
Huius ratio fundamentalis est. quod ut tangens semibasis vera se habet ad tangentem semiaggregati crurum, ita tangens semidifferentia crurum se habeat ad tangentem semibasis altera. Tangentium enim logarithmi sunt suorum arcuum differentiales per sect. 22. & 25. cap. 3. lib. 1. Unde hac tangentium analogiam sequetur illa suorum logarithmorum, seu differentialium æqualitas per prop. 4. cap. 2. lib. 1. Verum quia huius analogia tangentium fundamentalis, hactenus ignota, demonstrationem à me fortè requirent Lectores, eam ideo, quantum huius compendij breuitas patitur, hic explicabimus.

Sphæra itaque A F P G incumbat plano H I K Q, ut se invicem tangant in communi puncto A, à quo per Sphærae centrum<sup>o</sup> erigatur recta A<sup>o</sup> P secans supremum Sphærae Hemisphærium in puncto P. erique ita A<sup>o</sup> P perpendicularis plano H I K Q. deinde angulo A describatur in Sphærae superficie triangulum A λ γ in γ acutum, aut A λ β in β obtusum, & protractis semicirculis A λ P, & A γ P, seu A β P, polo λ. intervallo λ γ, seu ei æquali λ β ducatur circulus δ β γ, secans λ P in δ & λ A in δ & A β γ in punctis β & γ. Ex puncto λ in arcum A β γ dimittatur perpendicularis arcus λ μ. Erunt itaque hic A λ crus maius, λ γ vel λ β crus minus, A γ & A β bases, altera vera, reliqua altera, A δ differentia crurum, & A λ aggregatum crurum, quia λ δ & λ δ ex constructione sunt æqualia minori cruri λ γ seu λ β. His peractis, & supposito P vicem gerere oculi aut lucidi cuiuspiam, ab eodem P in subiectum planum H I K Q dimittantur, radius P γ secans planum in C, & radius P β secans planum in b: &

H

qui





quia  $\angle A$  in eodem plano seu circulo sunt cum lucido P, erunt suae umbræ c b A in eadem recta. Similiter ab eodem puncto P, in idem planum dimittantur radius P: secans planum in e, & radius P d secans planum in d. & quia  $\angle A$  in eodem sunt plano & circulo cum lucido P; ideo suae umbræ e d A erunt in eadem recta. Præterea quia P  $\odot$  A, est plano orthogonali seu rectangula, ideo triangula P, A, d. & P, A, e, at-

que

que P A b, & P A c, sunt in A rectangula, atque ideo etiam A d est tangens anguli A P d, seu A P, d, & A e est tangens anguli A P e vel A P e sic etiam A b est tangens anguli A P b vel A P b, & A c est tangens anguli A P c vel A P c, posito gnomone seu sinu toto P A. & quia A d est tangens anguli A P d, & A P d est dimidium anguli A  $\odot$  d per 20. prop. 3. Eucl. (quod hic sit in centro, ille in circumferentia) ideo A d est tangens dimidij anguli A  $\odot$  d, seu (quod idem est) dimidij arcus A d, quod est semidifferentia crurum. Similiter quia A e est tangens anguli A P e, angulus autem A P e in circumferentia sit dimidium anguli A  $\odot$  e in centro, ideo A e est tangens dimidij A  $\odot$  e, seu dimidij arcus, A e, quod est semiaggregatum crurum. Simili modo in basibus vera & alterna erit A b tangens anguli A P b, seu dimidij anguli A  $\odot$  b, seu dimidij arcus A b, quod est altera semibasis: atque A c erit tangens anguli A P c, seu dimidij anguli A  $\odot$  c, seu dimidij arcus A c, quod est reliqua semibasis. Quumque jam ostensum sit quod A b sit tangens alterius semibasis, & A c tangens reliquæ semibasis, atque A d sit tangens semidifferentiæ crurum, & A e tangens semiaggregati crurum. Dico quod ut A b tangens semibasis veræ se habet ad A e tangentem semiaggregati crurum, ita A d tangens semidifferentiæ crurum ad A e tangentem semibasis alterna: vel contra ex alterna veram faciendo, ut A c tangens semibasis veræ se habeat ad A e tangentem semiaggregati crurum: ita A d tangens semidifferentiæ crurum ad A b tangentem semibasis alterna. Quod sic probō. Si puncta b c d e sint in eodem circulo, erit (per 36. prop. 3. & 16. prop. 6. Euclid.) ut A b ad A e. Ita A d ad A c. & contra, & c. ut jam diximus. Verum puncta b c d e cadunt in eodem circulo: Omnis enim circuli in superficie Sphæræ descripti umbra à lucido sit eadem superficie, quod non est in circuli peripheria procedens circum circum facit perfectè rotundum in plano orthogono ad rectam, quæ à lucido per centrum Sphæræ progreditur, ut ex Opæricis & astrolabij fabrica patet. At hic circulus  $\odot$  b c d e in Sphæræ superficie describitur, & lucidum P. est extra circuli peripheriam, quæque ab eo procedit recta per cætrum (videlicet P  $\odot$  A) est ad planum orthogona. Necessariò ergo eius circuli umbra, quæ in puncta d. b. c. e. incidit, circularis est: & perfectè rotunda.

H 2 Ergo

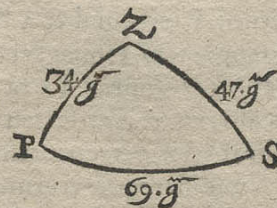


Ergo ut se habent A. B. ad A. C. Ita A. D. ad A. E. & contra, id est, ut tangens semibasis veræ ad tangentem semiaggregati crurum, ita tangens semidifferentiæ crurum ad tangentem semibasis alternæ: & per consequens, differentialis semibasis veræ, subductus ex summa differentiarum semiaggregati, & semidifferentiæ crurum, æquatur differentiali semibasis alternæ, quæ demonstranda suscepimus.

7. Unde trianguli Spherici datis tribus lateribus, habetur triplici modo angulorum quivis.

8. Primus modus est, ut lateris quodvis ( præcipue quadranti proximum ) pro basi statuas. Inde semidifferentiam crurum, & ad semibasim addas, & à semibasi subtrahas: producti & residui Logarithmos addas, hinc auferas aggregatum ex Logarithmis crurum, reliqui bipartiti Logarithmi arcum duplices, & proveniet angulus verticalis, atque ita ceteri.

Ut trianguli P Z S repetiti, dentur latera P Z 34 gr. & Z S 47 gr. & S P 69 gr. Quærantur anguli, primoque quadranti proximus P Z S angulus, quam S P 69 ( lateris scilicet quadranti proximum ) subtendit. Hoc itaque S P 69 pro



basi statuatur. Inde semidifferentiam crurum P Z, & Z S, videlicet 6.30. Et adde ad semibasim 34.30. fientque 41 aggregatum: & subtrahere ab ea, fientque 28. residuum.

Logarithmos graduum 41 scilicet 2215044, & graduum 28, scilicet 7561472 adde, fient 11776516. Similiter crurum P Z, 34 & Z S. 47. Logarithmos 5812006, & 3128180 adde, fientque 8941186. quibus ex 11776516 ablatis, fient 2835330: cuius dimidio logarithm. 1417665, respondentem arcum, videlicet 60. 12. 24. duplici, provenient 120. 24. 48. angulus verticalis P Z S. quæsitus. Nec secus angulos reliquos, si libet, invenire poteris: facilius tamen per 9. cap 5. huius innotescunt, quia per 2. sentent. cap. 3. sunt certæ speciei.

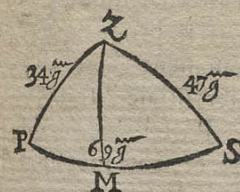
9. Secundus modus est, ut latere quovis ( præcipue quadranti proximo ) pro basi statuto, Semi-basim & ad semiaggregatum crurum addas, & ab eodem subtrahas: producti & residui Logarithmos addas, & hinc

& hinc auferas aggregatum ex logarithmis crurum, reliqui bipartiti antilogarithmi arcum duplices, & proveniet inde angulus verticalis: atque ita ceteri.

Ut eiusdem trianguli P. Z. S. ( constituti ut in præmissa ) semibasim 34.30 & ad semiaggregatum crurum 40.30. adde, fientque 75. & ab eodem subtrahere, fientque 6, quorum 75 & 6 graduum logarith. 346683, & 22582951 adde, fientque 22929634. Hinc autem aggregatum ex logarithmis crurum, quod (ut supra) est 8941186, fientque 13988448. Quæ bipartire, fient inde 6994224 antilogarithmus conveniens arcui 60. 12. 24. cuius duplum 120. 24. 48. est ( ut supra ) quæsitus angulus P Z S verticalis. Cæteros licet etiam hoc modo, facilius tamen per 9. cap. 5. huius invenies angulos. Sunt enim per 2. sent. cap. 3. notæ speciei.

10. Tertius modus est, ut latere quovis pro basi posito, differentialem semi-aggregati crurum ad differentialem semi-differentia crurum addas, & a producto auferas differentialem semi-basis veræ, & proveniet inde differentialis semibasis alternæ: quarum semibasium summa est casus maior, & differentia casus minor, duo distinguentes rectangula, quæ & suas, & ipsius oblati trianguli partes omnes (per nonam cap. 4. & octavam cap. 5. huius) notas reddunt.

Ut propositi trianguli P. Z. S. datis lateribus ut supra, quærantur anguli apud basim Z P S. & Z S P. Semi-aggregatum crurum P Z. & Z S. est 40.30. Semidifferentia crurum est 6.30. Illius differentialis est 1577296, huius verò est 21721209. Quos adde, fient 23298505. Hinc aufer semibasis veræ 34.30. differentialem 3750122, remanent 19548383, differentialis 8.3.31. pro semibasi alternæ. adde ergo semibases 34.30. & 8.3.31. fient inde 42.33.31. pro maiore casu M S. & subtrahere 8.3.31. à 34.30. relinquentur 26.26.29. pro minore casu P M. horum itaque casuum officio habes duo jam rectangula in M. scilicet P M Z, & S M Z: quæ &



perpendicularem Z M, & angulos verticales P Z M, & S Z M, aut, si libet, ipsum P Z S. patefaciunt ( per nonam cap. 4. & octavam cap. 5. huius. ) Sed his omissis ad quæsitos basis angulos Z P S, & Z S P, redeamus. Casus P M, 26, 26, 29. iam acquisiti dif-

H 3 ferem

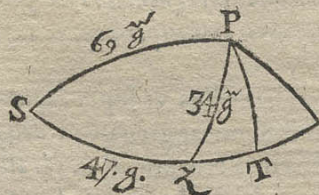


ferentialem 6985518 (per 2. cap. 4.) adde ad differentialem complementi P Z, scilicet ad differentialem 56, qui est — 3937709, provenient  $\dagger 3047809$  Logarithm. complementi anguli Z P S, quod complementum est 47.30. Similiter casus S M. 42.33.33, jam etiam acquisiti differentialem 853239 (per eandem notam sect.) adde ad differentialem complementi P Z, scilicet ad differentialem 43 gr. qui est 698698, provenient  $\dagger 1551937$  Logarithmus complementi anguli Z S P, quod complementum est 42.29.59. Memor autem hic sis non ipsas partes P Z. 34. & Z P S, aut P Z 47. & Z S P, sed sua complementa, viz. 56 gr. & 47.30. & 43 gr. & 58.53.33. circulares partes hic dici per secundam cap. 4. huius. Verus itaque angulus quæsitus Z P S est 42.29.59. & Z S P est 31.6.5. vt etiam ex sect. octava, cap. 5. huius patet.

*Aliud eiusdem trianguli exemplum.*

**E**odem triangulo P. Z. S. alio situ constituto, sit S. Z. basis, & datis lateribus vt supra, quærat angulus P. Z. S. Crurum itaque S. P. 69. & P Z. 34. semi-aggregatum est 51.30. eiusque differentialis — 2288650: semidifferentia vero est 17.30. eiusque differentialis est  $\dagger 1154234$ . Quos differentiales adde eorum summa  $\dagger 9253691$ . à qua aufer differentialem dimidii basis S Z videlicet differentialem 23.30. qui est 8328403, remanebit 925288

differentialis arcus 42.21.11. pro semi-basi alterna. Adde ergo semi-bases 42.21.11 & 23.30. provenient 65.51.11. pro maiore casu S T, & tum substrahe 23.30. à 42.21.11. remanent 18.51.11. pro minore casu T X, vel T Z. Huius ergo differentiale  $\dagger 1074520$ , adde ad differentialem complementum Z P, scilicet ad differentialem grad. 56, qui est — 3937709, & proveniet inde  $\dagger 6807492$  Logarithmus complementi anguli P Z T. Arcus autem in tabula respondens huic Logarithmo 6807492 ex aduerso, est graduum 56.35.11. pro angulo P Z T, cuius anguli P Z T, quum angulus quæsitus P Z S, sit ad semi-circulum reliquum (quod semper occurrit quum basis alterna est maior vera) erit necesse P Z S. esse graduum 120.24. min. 49. sec. alioquin si basis



sis vera alternam superauerit, coincident anguli P Z T, & P Z S, & æquales erunt.

### ADMONITIO.

**T**res iam habes veros modos inueniendi angulos ex datis lateribus, quorum vnoquoque tres variae solvuntur huius, & cuiuscunque trianguli quæstiones. Ex datis enim elevatione poli, altitudine solis, & declinatione solis, dubitantibus satisfacit ad quæstionem qua vel plaga solis, vel secundò angulus situs & positionis solis, vel tertio hora diei quæritur.

*Huc usque ex lateribus inuenimus angulos. Superest ex angulis inuenire latera.*

11. In omni triangulo sphaerico mutari possunt latera in angulos, & anguli in latera: assumptis tamen prius pro unico quouis angulo, & suo subtendente latere suis ad semicirculum reliquis.

*Exempli gratia.*

Est triangulum Q R T, cuius sint anguli Q 47. R 111. & T 34. Sumamus primò pro angulo quouis, videlicet pro R 111. suum ad semicirculum reliquum, quod est 69. grad. Dico hos angulos 47. 69. & 34. mutari posse in latera, & fiet superius triangulum P Z S. In quo P Z. est 34 grad. Z S. est 47 grad. & P S est 69 grad. vt etiam ex illius trianguli, P Z S, angulis, fient huius mutuo latera. Nam Z S P angulus grad. 31.6.5. illius, est latus Q R huius: & angulus

Z P S. grad. 42.29.59. illius est latus R T huius: & tertii anguli illius, qui est grad. 120.24.49. reliquum ad semi-circulum, quod est 59.35.11. est latus Q T huius. Cuius rei demonstrationem exhibent Bartholomæus Pitiscus, Adrianus Metius, & alij. Eam igitur hac epitome minimè reperendam censeo.

12. Vnde trianguli Sphaerici datis tribus angulis, facili conuersione acquiruntur latera.

Vt præcedentis trianguli Q R T dentur anguli Q 47. R 111. & T 34. Quærantur autem latera. Pro angulo quouis vnico, verbi gratia (vt supra) pro R 111. sumatur suum ad semicirculum reliquum 69. grad. Inde positus 47. 69. & 34. pro lateribus, vt in





ut in triangulo superiore P Z S factum est, per quemvis ex tribus modis superscriptis quære illius angulos, & inuenies contra latus 47, angulum  $42.29.59$ ; & contra latus 34, angulum  $31.6.5$ ; & contra latus 69 (quod pro 111 posuimus) reperies angulum  $120.24.49$ . Ideo in triangulo oblato Q R T, pro latere R T, subtendente angulum Q 47, pone  $42.29.59$ . Et pro latere Q R subtendente angulum T 34, pone  $31.6.5$ . verum pro latere Q T subtendente angulum R 111, pone  $59.35.11$ . quæ sunt reliquum graduum  $120.24.49$ , ad semi-circulum reliquum, scilicet 69. Et ita ex angulis per conuersionem acquies latera.

## AD MONITIO.

EX hac laterum per angulos datos inuentione tres variae soluantur huius, & cuiuscunque trianguli quæstiones. Ut in triangulo P Z S. Ex datis, hora diei, plaga solis, & angulo situs vel positionis solis, hæc præcedens satisfacit quæstioni, qua vel primò eleuatio poli, vel secundò altitudo solis, vel tertio declinatio solis quæritur. Ex octaua itaque scilicet præcedentis cap. 6. & septima ac duodecima huius, sexaginta habes variarum quæstionum solutiones, quæ in quodque triangulum cadunt. Nec his plures ex multiplici trium quarumlibet partium compositione oriri possunt variationes. Perfectam igitur habes, & absolutam triangulorum tam Sphæricorum, quam planorum doctrinam.

## CONCLUSIO.

Satis ergo iam ostensum est quod sint, quid sint, & cuius usus sint Logarithmi. Eorum enim beneficio absque multiplicationis, diuisionis, aut radicum extractionis molestia, omnis Geometricæ quæstionis solutionem logisticam promptissime exhiberi, tum apodicticè demonstrauimus, tum exemplis virisquæ Trigonometria docuimus. Promissum itaque mirificum Logarithmorum canonem habere, eiusque amplissimum usum: quæ si vobis eruditioribus grata fore ex rescriptis vestris intellexero, animus mihi addeatur, ad tabulæ condendæ methodum in lucem etiam proferendam. Interim hoc breui opusculo fruamini. Deoque opifici summo, omniumque operum bonorum apudlatari laudem summam & gloriam tribuite.

SEQVITVR

# T A B V L A

## CANONIS LOGARITHMORVM seu ARITHMETICARVM SVPPVTATIONVM.

~~~~~  
 Suit l'Indice du Canon des Logarithmes.

A S C A V O I R,

La Table de l'admirable inuention pour promptement & facilement *Abregger les supputations, d'Arithmetique avec son usage, en l'une & l'autre Trigonometrie, & aussi en toute Logistique Mathematique.*



L V G D V N I,  
 Apud BARTHOL. VINCENTIVM.

Cum priuilegio Cæsareo & Galliarum Regis.



Gr.

o

| min | Sinus | Logarithmi | Differentia | Logarithmi | Sinus    |
|-----|-------|------------|-------------|------------|----------|
| 0   | 0     | Infinitum  | Infinitum   | 0          | 10000000 |
| 1   | 2909  | 81425681   | 81425680    | 1          | 10000000 |
| 2   | 5818  | 74494213   | 74494211    | 2          | 9999998  |
| 3   | 8727  | 70439560   | 70439560    | 4          | 9999998  |
| 4   | 11636 | 67562746   | 67562739    | 7          | 9999993  |
| 5   | 14544 | 65331315   | 65331304    | 11         | 9999989  |
| 6   | 17453 | 63508099   | 63508083    | 16         | 9999986  |
| 7   | 20362 | 61966595   | 61966573    | 22         | 9999980  |
| 8   | 23271 | 60631284   | 60631256    | 28         | 9999974  |
| 9   | 26180 | 59453453   | 59453418    | 35         | 9999967  |
| 10  | 29088 | 58399857   | 58399814    | 43         | 9999959  |
| 11  | 31997 | 57446759   | 57446707    | 52         | 9999950  |
| 12  | 34906 | 56576646   | 56576584    | 62         | 9999940  |
| 13  | 37815 | 55776222   | 55776149    | 73         | 9999928  |
| 14  | 40724 | 55031148   | 55031064    | 84         | 9999917  |
| 15  | 43632 | 54345225   | 54345129    | 96         | 9999905  |
| 16  | 46541 | 53699843   | 53699734    | 109        | 9999892  |
| 17  | 49450 | 53093600   | 53093577    | 123        | 9999878  |
| 18  | 52359 | 52522019   | 52521881    | 138        | 9999863  |
| 19  | 55268 | 51981356   | 51981202    | 154        | 9999847  |
| 20  | 58177 | 51468431   | 51468361    | 170        | 9999831  |
| 21  | 61086 | 50980537   | 50980450    | 187        | 9999813  |
| 22  | 63995 | 50515342   | 50515137    | 205        | 9999795  |
| 23  | 66904 | 50070827   | 50070603    | 224        | 9999776  |
| 24  | 69813 | 49645239   | 49644995    | 244        | 9999756  |
| 25  | 72721 | 49237030   | 49236765    | 265        | 9999736  |
| 26  | 75630 | 48844826   | 48844539    | 287        | 9999714  |
| 27  | 78539 | 48467431   | 48467122    | 309        | 9999692  |
| 28  | 81448 | 48103763   | 48103431    | 332        | 9999668  |
| 29  | 84357 | 47752859   | 47752503    | 356        | 9999644  |
| 30  | 87265 | 47413852   | 47413471    | 381        | 9999619  |

89

Gr.

o

| min | Sinus  | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|--------|------------|-------------|------------|---------|
| 30  | 87265  | 47413471   | 47413471    | 381        | 9999619 |
| 31  | 90174  | 47085554   | 47085554    | 407        | 9999593 |
| 32  | 93083  | 46768049   | 46768049    | 434        | 9999566 |
| 33  | 95992  | 46460773   | 46460312    | 461        | 9999539 |
| 34  | 98901  | 46162254   | 46161765    | 489        | 9999511 |
| 35  | 101809 | 45872392   | 45871874    | 518        | 9999482 |
| 36  | 104718 | 45590688   | 45590140    | 548        | 9999452 |
| 37  | 107627 | 45316714   | 45316135    | 579        | 9999389 |
| 38  | 110536 | 45050041   | 45049430    | 611        | 9999389 |
| 39  | 113445 | 44790296   | 44789652    | 644        | 9999357 |
| 40  | 116353 | 44537132   | 44536455    | 677        | 9999357 |
| 41  | 119262 | 44290216   | 44289505    | 711        | 9999289 |
| 42  | 122171 | 44049255   | 44048509    | 746        | 9999254 |
| 43  | 125079 | 43813959   | 43813177    | 782        | 9999218 |
| 44  | 127988 | 43584078   | 43583259    | 819        | 9999181 |
| 45  | 130896 | 43359360   | 43358503    | 857        | 9999143 |
| 46  | 133805 | 43139582   | 43138686    | 896        | 9999105 |
| 47  | 136714 | 42924534   | 42923599    | 935        | 9999065 |
| 48  | 139622 | 42714014   | 42713039    | 975        | 9999025 |
| 49  | 142531 | 42507833   | 42506817    | 1016       | 9998984 |
| 50  | 145439 | 42305826   | 42304768    | 1058       | 9998942 |
| 51  | 148348 | 42107812   | 42106711    | 1101       | 9998900 |
| 52  | 151257 | 41913644   | 41912499    | 1145       | 9998856 |
| 53  | 154164 | 41723175   | 41721986    | 1189       | 9998811 |
| 54  | 157075 | 41536271   | 41535037    | 1234       | 9998766 |
| 55  | 159982 | 41352795   | 41351515    | 1280       | 9998720 |
| 56  | 162891 | 41172626   | 41171299    | 1327       | 9998673 |
| 57  | 165799 | 41006643   | 41005268    | 1375       | 9998625 |
| 58  | 168708 | 40821746   | 40820322    | 1424       | 9998577 |
| 59  | 171616 | 40650816   | 40649343    | 1473       | 9998527 |
| 60  | 174524 | 40482764   | 40481241    | 1523       | 9998477 |

A 2

89

min  
Gr.  
89



| Gr.  | I      |            |             |            |         |
|------|--------|------------|-------------|------------|---------|
| min. | Sinus  | Logarithmi | Differentia | Logarithmi | Sinus   |
| 0    | 174524 | 40482764   | 40481241    | 1523       | 9998477 |
| 1    | 177433 | 40317483   | 40315909    | 1574       | 9998426 |
| 2    | 180341 | 40154899   | 40153273    | 1626       | 9998374 |
| 3    | 183250 | 39994918   | 39993239    | 1679       | 9998321 |
| 4    | 186158 | 39837448   | 39835715    | 1733       | 9998267 |
| 5    | 189066 | 39682421   | 39680633    | 1788       | 9998212 |
| 6    | 191975 | 39529765   | 39527922    | 1843       | 9998157 |
| 7    | 194883 | 39379407   | 39377598    | 1899       | 9998101 |
| 8    | 197792 | 39231274   | 39229318    | 1956       | 9998044 |
| 9    | 200700 | 39085307   | 39083293    | 2014       | 9997986 |
| 10   | 203608 | 38941441   | 38939368    | 2073       | 9997927 |
| 11   | 206517 | 38799612   | 38797479    | 2133       | 9997867 |
| 12   | 209425 | 38659767   | 38657573    | 2194       | 9997806 |
| 13   | 212333 | 38521858   | 38519603    | 2255       | 9997745 |
| 14   | 215241 | 38385824   | 38383507    | 2317       | 9997683 |
| 15   | 218149 | 38251613   | 38249233    | 2380       | 9997620 |
| 16   | 221057 | 38119183   | 38116739    | 2444       | 9997556 |
| 17   | 223965 | 37988481   | 37985972    | 2509       | 9997491 |
| 18   | 226873 | 37859471   | 37856896    | 2575       | 9997425 |
| 19   | 229781 | 37732105   | 37729464    | 2641       | 9997359 |
| 20   | 232689 | 37606339   | 37603631    | 2708       | 9997292 |
| 21   | 235597 | 37482135   | 37479359    | 2776       | 9997224 |
| 22   | 238505 | 37359458   | 37356613    | 2845       | 9997155 |
| 23   | 241413 | 37238269   | 37235354    | 2915       | 9997085 |
| 24   | 244321 | 37118532   | 37115546    | 2986       | 9997014 |
| 25   | 247229 | 37000208   | 36997150    | 3058       | 9996943 |
| 26   | 250137 | 36883272   | 36880142    | 3130       | 9996871 |
| 27   | 253045 | 36767690   | 36764487    | 3203       | 9996798 |
| 28   | 255953 | 36653428   | 36650151    | 3277       | 9996724 |
| 29   | 258861 | 36540448   | 36537096    | 3352       | 9996649 |
| 30   | 261769 | 36428748   | 36425320    | 3428       | 9996573 |

| Gr.  | I      |            |             |            |         |
|------|--------|------------|-------------|------------|---------|
| min. | Sinus  | Logarithmi | Differentia | Logarithmi | Sinus   |
| 30   | 261769 | 36428748   | 36425320    | 3428       | 9996573 |
| 31   | 264677 | 36318272   | 36314768    | 3504       | 9996496 |
| 32   | 267585 | 36209009   | 36205427    | 3582       | 9996419 |
| 33   | 270493 | 36100924   | 36097264    | 3660       | 9996341 |
| 34   | 273401 | 35994000   | 35990261    | 3739       | 9996262 |
| 35   | 276308 | 35888207   | 35884388    | 3819       | 9996182 |
| 36   | 279216 | 35783520   | 35779620    | 3900       | 9996101 |
| 37   | 282124 | 35679917   | 35675935    | 3982       | 9996019 |
| 38   | 285032 | 35577380   | 35573316    | 4064       | 9995937 |
| 39   | 287940 | 35475892   | 35471745    | 4147       | 9995854 |
| 40   | 290847 | 35375415   | 35371184    | 4231       | 9995770 |
| 41   | 293755 | 35275935   | 35271619    | 4316       | 9995685 |
| 42   | 296663 | 35177444   | 35173042    | 4402       | 9995599 |
| 43   | 299570 | 35079909   | 35075420    | 4489       | 9995512 |
| 44   | 302478 | 34983320   | 34978743    | 4577       | 9995424 |
| 45   | 305385 | 34887652   | 34882987    | 4665       | 9995336 |
| 46   | 308293 | 34792895   | 34788141    | 4754       | 9995247 |
| 47   | 311200 | 34699029   | 34694185    | 4844       | 9995157 |
| 48   | 314108 | 34606036   | 34601101    | 4935       | 9995066 |
| 49   | 317015 | 34513899   | 34508872    | 5027       | 9994974 |
| 50   | 319922 | 34422606   | 34417486    | 5120       | 9994881 |
| 51   | 322830 | 34332140   | 34326926    | 5214       | 9994787 |
| 52   | 325737 | 34242484   | 34237176    | 5308       | 9994693 |
| 53   | 328645 | 34153629   | 34148226    | 5403       | 9994598 |
| 54   | 331552 | 34065499   | 34060100    | 5499       | 9994502 |
| 55   | 334459 | 33978046   | 33972650    | 5596       | 9994405 |
| 56   | 337367 | 33891701   | 33886007    | 5694       | 9994307 |
| 57   | 340274 | 33805893   | 33800100    | 5793       | 9994208 |
| 58   | 343181 | 33720820   | 33714927    | 5893       | 9994109 |
| 59   | 346088 | 33636464   | 33630471    | 5993       | 9994009 |
| 60   | 348995 | 33552817   | 33546723    | 6094       | 9993908 |



Gr.

2

| min | Sinus  | Logarithmi | Differentia | Logarithmi | Sinus      |
|-----|--------|------------|-------------|------------|------------|
| 0   | 348955 | 33552817   | 33546723    | 6094       | 9993908160 |
| 1   | 351902 | 33469860   | 33463664    | 6196       | 9993806159 |
| 2   | 354809 | 33387588   | 33381289    | 6299       | 9993703158 |
| 3   | 357716 | 33305993   | 33299590    | 6403       | 9993599157 |
| 4   | 360623 | 33225056   | 33218549    | 6507       | 9993495156 |
| 5   | 363530 | 33144770   | 33138158    | 6612       | 9993390155 |
| 6   | 366437 | 33065128   | 33058410    | 6718       | 9993284154 |
| 7   | 369344 | 32986107   | 32979282    | 6825       | 9993177153 |
| 8   | 372251 | 32907712   | 32900779    | 6933       | 9993069152 |
| 9   | 375158 | 32829923   | 32822881    | 7042       | 9992960151 |
| 10  | 378064 | 32752740   | 32745588    | 7152       | 9992850150 |
| 11  | 380971 | 32676149   | 32668887    | 7262       | 9992740149 |
| 12  | 383878 | 32600139   | 32592866    | 7373       | 9992629148 |
| 13  | 386785 | 32524706   | 32517221    | 7485       | 9992517147 |
| 14  | 389692 | 32449837   | 32442239    | 7598       | 9992404146 |
| 15  | 392598 | 32375526   | 32367814    | 7712       | 9992290145 |
| 16  | 395505 | 32301761   | 32293934    | 7827       | 9992175144 |
| 17  | 398412 | 32228539   | 32220596    | 7943       | 9992060143 |
| 18  | 401318 | 32155852   | 32147793    | 8059       | 9991944142 |
| 19  | 404225 | 32083692   | 32075516    | 8176       | 9991827141 |
| 20  | 407131 | 32012045   | 32003751    | 8294       | 9991709140 |
| 21  | 410038 | 31940909   | 31932496    | 8413       | 9991590139 |
| 22  | 412944 | 31870276   | 31861743    | 8533       | 9991470138 |
| 23  | 415851 | 31800141   | 31791887    | 8654       | 9991349137 |
| 24  | 418757 | 31730492   | 31721716    | 8776       | 9991228136 |
| 25  | 421663 | 31661332   | 31652434    | 8898       | 9991106135 |
| 26  | 424570 | 31592644   | 31583623    | 9021       | 9990983134 |
| 27  | 427476 | 31524424   | 31515279    | 9145       | 9990859133 |
| 28  | 430382 | 31456672   | 31447402    | 9270       | 9990734132 |
| 29  | 433288 | 31389371   | 31379975    | 9396       | 9990608131 |
| 30  | 436194 | 31322524   | 31313001    | 9523       | 9990482130 |

Gr.

2

| min | Sinus  | Logarithmi | Differentia | Logarithmi | Sinus      |
|-----|--------|------------|-------------|------------|------------|
| 30  | 436194 | 31322524   | 31313001    | 9523       | 9990482130 |
| 31  | 439100 | 31256121   | 31246471    | 9650       | 9990355129 |
| 32  | 442006 | 31190158   | 31180380    | 9778       | 9990227128 |
| 33  | 444912 | 31124626   | 31114719    | 9907       | 9990098127 |
| 34  | 447818 | 31059521   | 31049484    | 10037      | 9989968126 |
| 35  | 450724 | 30994841   | 30984673    | 10168      | 9989837125 |
| 36  | 453630 | 30930577   | 30920277    | 10300      | 9989706124 |
| 37  | 456536 | 30866722   | 30856290    | 10432      | 9989574123 |
| 38  | 459442 | 30803277   | 30792712    | 10565      | 9989441122 |
| 39  | 462348 | 30740230   | 30729531    | 10699      | 9989307121 |
| 40  | 465253 | 30677578   | 30666744    | 10834      | 9989172120 |
| 41  | 468159 | 30615317   | 30604347    | 10970      | 9989036119 |
| 42  | 471065 | 30553442   | 30542335    | 11107      | 9988899118 |
| 43  | 473970 | 30491949   | 30480704    | 11245      | 9988761117 |
| 44  | 476876 | 30430834   | 30419451    | 11383      | 9988623116 |
| 45  | 479781 | 30370090   | 30358568    | 11522      | 9988484115 |
| 46  | 482687 | 30309715   | 30298053    | 11662      | 9988344114 |
| 47  | 485592 | 30249702   | 30237899    | 11803      | 9988203113 |
| 48  | 488498 | 30190049   | 30178104    | 11945      | 9988060112 |
| 49  | 491403 | 30130749   | 30118661    | 12088      | 9987918111 |
| 50  | 494308 | 30071797   | 30059565    | 12232      | 9987775110 |
| 51  | 497214 | 30013193   | 30000817    | 12376      | 9987631109 |
| 52  | 500119 | 29954933   | 29942412    | 12521      | 9987486108 |
| 53  | 503024 | 29897014   | 29884347    | 12667      | 9987340107 |
| 54  | 505929 | 29839424   | 29826610    | 12814      | 9987193106 |
| 55  | 508834 | 29782165   | 29769203    | 12962      | 9987045105 |
| 56  | 511740 | 29725236   | 29712125    | 13111      | 9986897104 |
| 57  | 514645 | 29668628   | 29655367    | 13261      | 9986748103 |
| 58  | 517550 | 29612331   | 29598920    | 13411      | 9986598102 |
| 59  | 520455 | 29556458   | 29542796    | 13562      | 9986447101 |
| 60  | 524360 | 29500706   | 29486992    | 13714      | 9986295100 |



Gr. 3

| min | Sinus  | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|--------|------------|-------------|------------|---------|
| 0   | 523360 | 29500706   | 29486992    | 13714      | 9986295 |
| 1   | 526265 | 29445354   | 29431487    | 13867      | 9986143 |
| 2   | 529170 | 29390307   | 29376286    | 14021      | 9985989 |
| 3   | 532075 | 29335565   | 29321389    | 14176      | 9985835 |
| 4   | 534980 | 29281122   | 29266791    | 14331      | 9985680 |
| 5   | 537884 | 29226973   | 29212486    | 14487      | 9985524 |
| 6   | 540789 | 29173115   | 29158471    | 14644      | 9985367 |
| 7   | 543694 | 29119548   | 29104746    | 14802      | 9985209 |
| 8   | 546598 | 29066270   | 29051309    | 14961      | 9985050 |
| 9   | 549503 | 29013273   | 28998152    | 15121      | 9984891 |
| 10  | 552407 | 28960557   | 28945276    | 15281      | 9984731 |
| 11  | 555312 | 28908117   | 28892675    | 15442      | 9984570 |
| 12  | 558216 | 28855951   | 28840347    | 15604      | 9984408 |
| 13  | 561120 | 28804057   | 28788290    | 15767      | 9984245 |
| 14  | 564024 | 28752430   | 28736499    | 15931      | 9984081 |
| 15  | 566928 | 28701071   | 28684975    | 16096      | 9983917 |
| 16  | 569832 | 28649975   | 28633714    | 16261      | 9983752 |
| 17  | 572736 | 28599142   | 28582715    | 16427      | 9983586 |
| 18  | 575640 | 28548570   | 28531976    | 16594      | 9983419 |
| 19  | 578544 | 28498247   | 28481485    | 16762      | 9983251 |
| 20  | 581448 | 28448177   | 28431246    | 16931      | 9983082 |
| 21  | 584352 | 28398354   | 28381253    | 17101      | 9982912 |
| 22  | 587256 | 28348782   | 28331510    | 17272      | 9982742 |
| 23  | 590160 | 28299459   | 28282015    | 17444      | 9982571 |
| 24  | 593064 | 28250377   | 28232761    | 17616      | 9982399 |
| 25  | 595967 | 28201535   | 28183746    | 17789      | 9982226 |
| 26  | 598871 | 28152930   | 28134967    | 17963      | 9982052 |
| 27  | 601775 | 28104561   | 28086423    | 18138      | 9981877 |
| 28  | 604678 | 28056428   | 28038114    | 18314      | 9981701 |
| 29  | 607582 | 28008424   | 27990033    | 18491      | 9981525 |
| 30  | 610485 | 27960848   | 27942178    | 18670      | 9981348 |

Gr. 3

| min | Sinus  | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|--------|------------|-------------|------------|---------|
| 30  | 610485 | 27960848   | 27942178    | 18670      | 9981348 |
| 31  | 613389 | 27913400   | 27894552    | 18848      | 9981170 |
| 32  | 616292 | 27866180   | 27847153    | 19027      | 9980991 |
| 33  | 619196 | 27819184   | 27799977    | 19207      | 9980811 |
| 34  | 622099 | 27772408   | 27753020    | 19388      | 9980631 |
| 35  | 625002 | 27725848   | 27706278    | 19570      | 9980450 |
| 36  | 627905 | 27679504   | 27659752    | 19752      | 9980268 |
| 37  | 630808 | 27633374   | 27613439    | 19935      | 9980085 |
| 38  | 633711 | 27587457   | 27567318    | 20119      | 9979901 |
| 39  | 636614 | 27541753   | 27521449    | 20304      | 9979716 |
| 40  | 639517 | 27496257   | 27475767    | 20490      | 9979530 |
| 41  | 642420 | 27450968   | 27430291    | 20677      | 9979343 |
| 42  | 645323 | 27405885   | 27385020    | 20865      | 9979156 |
| 43  | 648226 | 27361003   | 27339950    | 21053      | 9978968 |
| 44  | 651129 | 27316323   | 27295081    | 21242      | 9978779 |
| 45  | 654031 | 27271843   | 27250411    | 21432      | 9978589 |
| 46  | 656934 | 27227563   | 27205940    | 21623      | 9978398 |
| 47  | 659837 | 27183476   | 27161661    | 21815      | 9978207 |
| 48  | 662739 | 27139581   | 27117573    | 22008      | 9978015 |
| 49  | 665642 | 27095878   | 27073676    | 22202      | 9977822 |
| 50  | 668544 | 27052373   | 27029976    | 22397      | 9977628 |
| 51  | 671447 | 27009057   | 26986465    | 22592      | 9977433 |
| 52  | 674349 | 26965926   | 26943138    | 22788      | 9977237 |
| 53  | 677251 | 26922980   | 26899995    | 22985      | 9977040 |
| 54  | 680153 | 26880218   | 26857035    | 23183      | 9976843 |
| 55  | 683055 | 26837639   | 26814257    | 23382      | 9976645 |
| 56  | 685957 | 26795243   | 26771661    | 23582      | 9976446 |
| 57  | 688859 | 26753027   | 26729244    | 23783      | 9976246 |
| 58  | 691761 | 26710988   | 26687003    | 23985      | 9976045 |
| 59  | 694663 | 26669126   | 26644919    | 24187      | 9975843 |
| 60  | 697565 | 26627442   | 26603052    | 24390      | 9975640 |



| Gr. | 4      |            |             |            |         |
|-----|--------|------------|-------------|------------|---------|
| min | Sinus  | Logarithmi | Differentia | Logarithmi | Sinus   |
| 0   | 697565 | 26627442   | 26603052    | 24320      | 9975640 |
| 1   | 700467 | 26585929   | 26561335    | 24594      | 9975437 |
| 2   | 703369 | 26544587   | 26519788    | 24799      | 9975233 |
| 3   | 706270 | 26503416   | 26478411    | 25005      | 9975028 |
| 4   | 709172 | 26462418   | 26437207    | 25211      | 9974822 |
| 5   | 712073 | 26421589   | 26396171    | 25418      | 9974615 |
| 6   | 714975 | 26380927   | 26355301    | 25626      | 9974408 |
| 7   | 717876 | 26340428   | 26314593    | 25835      | 9974200 |
| 8   | 720777 | 26300094   | 26274050    | 26044      | 9973991 |
| 9   | 723678 | 26259923   | 26233669    | 26254      | 9973781 |
| 10  | 726579 | 26219913   | 26193448    | 26465      | 9973570 |
| 11  | 729480 | 26180067   | 26153390    | 26677      | 9973358 |
| 12  | 732381 | 26140377   | 26113487    | 26890      | 9973145 |
| 13  | 735282 | 26100842   | 26073738    | 27104      | 9972931 |
| 14  | 738183 | 26061465   | 26034146    | 27319      | 9972717 |
| 15  | 741084 | 26022244   | 25994709    | 27535      | 9972502 |
| 16  | 743985 | 25983176   | 25955424    | 27752      | 9972286 |
| 17  | 746886 | 25944260   | 25916290    | 27970      | 9972069 |
| 18  | 749787 | 25905496   | 25877308    | 28188      | 9971851 |
| 19  | 752688 | 25866884   | 25838477    | 28407      | 9971633 |
| 20  | 755588 | 25828423   | 25799796    | 28627      | 9971414 |
| 21  | 758489 | 25790110   | 25761262    | 28848      | 9971194 |
| 22  | 761389 | 25751942   | 25722872    | 29070      | 9970973 |
| 23  | 764290 | 25713920   | 25684727    | 29293      | 9970751 |
| 24  | 767180 | 25676043   | 25646527    | 29516      | 9970528 |
| 25  | 770090 | 25638310   | 25608570    | 29740      | 9970304 |
| 26  | 772991 | 25600722   | 25570757    | 29965      | 9970079 |
| 27  | 775891 | 25563273   | 25533082    | 30191      | 9969854 |
| 28  | 778791 | 25525966   | 25495548    | 30418      | 9969628 |
| 29  | 781691 | 25488798   | 25458152    | 30646      | 9969401 |
| 30  | 784591 | 25451769   | 25420894    | 30875      | 9969173 |

85

| Gr. | 4      |            |             |            |         |
|-----|--------|------------|-------------|------------|---------|
| min | Sinus  | Logarithmi | Differentia | Logarithmi | Sinus   |
| 30  | 784591 | 25451769   | 25420894    | 30875      | 9969173 |
| 31  | 78749  | 25414876   | 25383772    | 31104      | 9968944 |
| 32  | 790391 | 25378119   | 25346785    | 31334      | 9968715 |
| 33  | 793291 | 25341498   | 25309933    | 31565      | 9968485 |
| 34  | 796191 | 25305013   | 25273216    | 31797      | 9968254 |
| 35  | 799090 | 25268662   | 25236632    | 32030      | 9968023 |
| 36  | 801990 | 25232442   | 25200178    | 32264      | 9967789 |
| 37  | 804889 | 25196355   | 25163857    | 32498      | 9967555 |
| 38  | 807789 | 25160399   | 25127666    | 32733      | 9967320 |
| 39  | 810688 | 25124571   | 25091602    | 32969      | 9967085 |
| 40  | 813587 | 25088870   | 25055664    | 33206      | 9966849 |
| 41  | 816486 | 25053298   | 25019854    | 33444      | 9966613 |
| 42  | 819385 | 25017853   | 24984170    | 33683      | 9966374 |
| 43  | 822284 | 24982533   | 24948610    | 33923      | 9966135 |
| 44  | 825183 | 24947340   | 24913177    | 34163      | 9965895 |
| 45  | 828082 | 24912272   | 24877866    | 34404      | 9965655 |
| 46  | 830981 | 24877326   | 24842680    | 34646      | 9965414 |
| 47  | 833880 | 24842502   | 24807613    | 34889      | 9965172 |
| 48  | 836778 | 24807799   | 24772666    | 35133      | 9964929 |
| 49  | 839677 | 24773219   | 24737841    | 35378      | 9964685 |
| 50  | 842575 | 24738761   | 24703138    | 35623      | 9964440 |
| 51  | 845474 | 24704420   | 24668551    | 35869      | 9964194 |
| 52  | 848372 | 24670196   | 24634080    | 36116      | 9963948 |
| 53  | 851271 | 24636090   | 24599726    | 36364      | 9963701 |
| 54  | 854169 | 24602100   | 24565487    | 36613      | 9963453 |
| 55  | 857067 | 24568228   | 24531365    | 36863      | 9963204 |
| 56  | 859965 | 24534473   | 24497359    | 37114      | 9962954 |
| 57  | 862863 | 24500829   | 24463463    | 37366      | 9962703 |
| 58  | 865761 | 24467298   | 24429679    | 37619      | 9962452 |
| 59  | 868659 | 24433880   | 24396008    | 37872      | 9962200 |
| 60  | 871557 | 24400570   | 24362452    | 38126      | 9961947 |

B 2

85

Gr.  
85



| Gr. | 5      |            |             |            |         |    |
|-----|--------|------------|-------------|------------|---------|----|
| mi. | Sinus  | Logarithmi | Differentia | Logarithmi | Sinus   |    |
| 0   | 871557 | 24400578   | 24362452    | 38126      | 9961947 | 60 |
| 1   | 874455 | 24367384   | 24329003    | 38381      | 9961693 | 59 |
| 2   | 877353 | 24334302   | 24295665    | 38637      | 9961438 | 58 |
| 3   | 880250 | 24301329   | 24262435    | 38894      | 9961183 | 57 |
| 4   | 883148 | 24268467   | 24229316    | 39151      | 9960927 | 56 |
| 5   | 886045 | 24235712   | 24196303    | 39409      | 9960670 | 55 |
| 6   | 888943 | 24203064   | 24163396    | 39668      | 9960412 | 54 |
| 7   | 891840 | 24170523   | 24130595    | 39928      | 9960153 | 53 |
| 8   | 894737 | 24138089   | 24097900    | 40189      | 9959893 | 52 |
| 9   | 897634 | 24105760   | 24065309    | 40451      | 9959632 | 51 |
| 10  | 900531 | 24073540   | 24032827    | 40713      | 9959370 | 50 |
| 11  | 903428 | 24041422   | 24000446    | 40976      | 9959107 | 49 |
| 12  | 906325 | 24009408   | 23968168    | 41240      | 9958844 | 48 |
| 13  | 909222 | 23977495   | 23935990    | 41505      | 9958580 | 47 |
| 14  | 912119 | 23945985   | 23903914    | 41771      | 9958315 | 46 |
| 15  | 915016 | 23913978   | 23871940    | 42038      | 9958049 | 45 |
| 16  | 917911 | 23882373   | 23840067    | 42306      | 9957782 | 44 |
| 17  | 920809 | 23850867   | 23808292    | 42575      | 9957515 | 43 |
| 18  | 923706 | 23819460   | 23776615    | 42845      | 9957247 | 42 |
| 19  | 926602 | 23788153   | 23745038    | 43115      | 9956978 | 41 |
| 20  | 929498 | 23756943   | 23713557    | 43386      | 9956708 | 40 |
| 21  | 932395 | 23725832   | 23682174    | 43658      | 9956437 | 39 |
| 22  | 935291 | 23694818   | 23650887    | 43931      | 9956165 | 38 |
| 23  | 938187 | 23663900   | 23619695    | 44205      | 9955893 | 37 |
| 24  | 941083 | 23633080   | 23588601    | 44479      | 9955620 | 36 |
| 25  | 943979 | 23602355   | 23557601    | 44754      | 9955346 | 35 |
| 26  | 946875 | 23571725   | 23526695    | 45030      | 9955071 | 34 |
| 27  | 949771 | 23541190   | 23495883    | 45307      | 9954795 | 33 |
| 28  | 952667 | 23510748   | 23465163    | 45585      | 9954518 | 32 |
| 29  | 955563 | 23480399   | 23434535    | 45864      | 9954240 | 31 |
| 30  | 958458 | 23450143   | 23403999    | 46144      | 9953962 | 30 |

| Gr. | 5       |            |             |            |         |    |
|-----|---------|------------|-------------|------------|---------|----|
| min | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |    |
| 30  | 958458  | 23450143   | 23403999    | 46144      | 9953962 | 30 |
| 31  | 961354  | 23419980   | 23373556    | 46424      | 9953683 | 29 |
| 32  | 964249  | 23389908   | 23343203    | 46705      | 9953403 | 28 |
| 33  | 967144  | 23359927   | 23312940    | 46987      | 9953122 | 27 |
| 34  | 970039  | 23330036   | 23282766    | 47270      | 9952840 | 26 |
| 35  | 972934  | 23300235   | 23252681    | 47554      | 9952557 | 25 |
| 36  | 975829  | 23270525   | 23222686    | 47839      | 9952274 | 24 |
| 37  | 978724  | 23240903   | 23192778    | 48125      | 9951990 | 23 |
| 38  | 981619  | 23211368   | 23162956    | 48412      | 9951705 | 22 |
| 39  | 984514  | 23181920   | 23133220    | 48700      | 9951419 | 21 |
| 40  | 987408  | 23152560   | 23103572    | 48988      | 9951132 | 20 |
| 41  | 990303  | 23123287   | 23074010    | 49277      | 9950844 | 19 |
| 42  | 993198  | 23094100   | 23044533    | 49567      | 9950555 | 18 |
| 43  | 996092  | 23064999   | 23015141    | 49858      | 9950266 | 17 |
| 44  | 998987  | 23035985   | 22985836    | 50149      | 9949976 | 16 |
| 45  | 1001881 | 23007056   | 22956615    | 50441      | 9949685 | 15 |
| 46  | 1004775 | 22978212   | 22927478    | 50734      | 9949393 | 14 |
| 47  | 1007669 | 22949449   | 22898421    | 51028      | 9949100 | 13 |
| 48  | 1010563 | 22920769   | 22869446    | 51323      | 9948807 | 12 |
| 49  | 1013457 | 22892172   | 22840553    | 51619      | 9948513 | 11 |
| 50  | 1016351 | 22863658   | 22811742    | 51916      | 9948218 | 10 |
| 51  | 1019245 | 22835227   | 22783013    | 52214      | 9947922 | 9  |
| 52  | 1022139 | 22806878   | 22754366    | 52512      | 9947625 | 8  |
| 53  | 1025032 | 22778609   | 22725798    | 52811      | 9947327 | 7  |
| 54  | 1027926 | 22750420   | 22697309    | 53111      | 9947028 | 6  |
| 55  | 1030819 | 22722311   | 22668899    | 53412      | 9946729 | 5  |
| 56  | 1033713 | 22694283   | 22640569    | 53714      | 9946429 | 4  |
| 57  | 1036606 | 22666333   | 22612316    | 54017      | 9946128 | 3  |
| 58  | 1039499 | 22638461   | 22584140    | 54321      | 9945826 | 2  |
| 59  | 1042392 | 22610667   | 22556041    | 54626      | 9945523 | 1  |
| 60  | 1045285 | 22582951   | 22528019    | 54932      | 9945219 | 0  |



Gr. 6

| min | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 1045285 | 22582951   | 22528019    | 54932      | 9945219 |
| 1   | 1048178 | 22555313   | 22500075    | 55238      | 9944914 |
| 2   | 1051071 | 22527752   | 22472207    | 55545      | 9944909 |
| 3   | 1053964 | 22500267   | 22444414    | 55853      | 9944303 |
| 4   | 1056857 | 22472859   | 22416697    | 56162      | 9943996 |
| 5   | 1059749 | 22445527   | 22389055    | 56472      | 9943688 |
| 6   | 1062642 | 22418272   | 22361490    | 56782      | 9943379 |
| 7   | 1065534 | 22391091   | 22333998    | 57093      | 9943069 |
| 8   | 1068426 | 22363984   | 22306579    | 57405      | 9942759 |
| 9   | 1071318 | 22336951   | 22279233    | 57718      | 9942448 |
| 10  | 1074210 | 22309991   | 22251959    | 58032      | 9942136 |
| 11  | 1077102 | 22283104   | 22224757    | 58347      | 9941823 |
| 12  | 1079994 | 22256290   | 22197627    | 58663      | 9941509 |
| 13  | 1082886 | 22229549   | 22170570    | 58979      | 9941194 |
| 14  | 1085778 | 22202881   | 22143585    | 59296      | 9940879 |
| 15  | 1088669 | 22176285   | 22116671    | 59614      | 9940563 |
| 16  | 1091561 | 22149762   | 22089829    | 59933      | 9940246 |
| 17  | 1094452 | 22123308   | 22063055    | 60253      | 9939928 |
| 18  | 1097344 | 22096925   | 22036351    | 60574      | 9939609 |
| 19  | 1100235 | 22070612   | 22009717    | 60895      | 9939290 |
| 20  | 1103126 | 22044368   | 21983151    | 61217      | 9938970 |
| 21  | 1106017 | 22018195   | 21956655    | 61540      | 9938649 |
| 22  | 1108908 | 21992090   | 21930226    | 61864      | 9938327 |
| 23  | 1111799 | 21966054   | 21903865    | 62189      | 9938004 |
| 24  | 1114690 | 21940086   | 21877571    | 62515      | 9937680 |
| 25  | 1117580 | 21914186   | 21851344    | 62842      | 9937355 |
| 26  | 1120471 | 21888355   | 21825185    | 63170      | 9937029 |
| 27  | 1123361 | 21862590   | 21799091    | 63499      | 9936703 |
| 28  | 1126251 | 21836892   | 21773064    | 63818      | 9936376 |
| 29  | 1129142 | 21811261   | 21747103    | 64158      | 9936048 |
| 30  | 1132032 | 21785693   | 21721209    | 64489      | 9935719 |

83

Gr. 6

| min | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 1132032 | 21785693   | 21721209    | 64489      | 9935719 |
| 31  | 1134922 | 21760199   | 21695378    | 64821      | 9935389 |
| 32  | 1137812 | 21734767   | 21669613    | 65154      | 9935058 |
| 33  | 1140702 | 21709400   | 21643912    | 65488      | 9934727 |
| 34  | 1143592 | 21684100   | 21618278    | 65822      | 9934395 |
| 35  | 1146482 | 21658865   | 21592708    | 66157      | 9934062 |
| 36  | 1149372 | 21633695   | 21567202    | 66493      | 9933728 |
| 37  | 1152261 | 21608586   | 21541756    | 66830      | 9933393 |
| 38  | 1155151 | 21583540   | 21516372    | 67168      | 9933057 |
| 39  | 1158040 | 21558557   | 21491050    | 67507      | 9932721 |
| 40  | 1160929 | 21533639   | 21465793    | 67846      | 9932384 |
| 41  | 1163818 | 21508781   | 21440595    | 68186      | 9932046 |
| 42  | 1166707 | 21483986   | 21415459    | 68527      | 9931707 |
| 43  | 1169596 | 21459254   | 21390385    | 68869      | 9931367 |
| 44  | 1172485 | 21434585   | 21365373    | 69212      | 9931026 |
| 45  | 1175374 | 21409979   | 21340423    | 69556      | 9930685 |
| 46  | 1178263 | 21385434   | 21315533    | 69901      | 9930343 |
| 47  | 1181151 | 21360949   | 21290702    | 70247      | 9930000 |
| 48  | 1184040 | 21336524   | 21265931    | 70593      | 9929656 |
| 49  | 1186928 | 21312160   | 21241220    | 70940      | 9929311 |
| 50  | 1189816 | 21287855   | 21216567    | 71288      | 9928965 |
| 51  | 1192704 | 21263609   | 21191972    | 71637      | 9928618 |
| 52  | 1195592 | 21239423   | 21167436    | 71987      | 9928271 |
| 53  | 1198480 | 21215297   | 21142959    | 72338      | 9927929 |
| 54  | 1201368 | 21191230   | 21118540    | 72690      | 9927574 |
| 55  | 1204255 | 21167222   | 21094179    | 73043      | 9927224 |
| 56  | 1207143 | 21143273   | 21069877    | 73396      | 9926873 |
| 57  | 1210031 | 21119381   | 21045631    | 73750      | 9926521 |
| 58  | 1212918 | 21095546   | 21021441    | 74105      | 9926169 |
| 59  | 1215806 | 21071769   | 20997308    | 74461      | 9925816 |
| 860 | 1218693 | 21048049   | 20973231    | 74818      | 9925461 |

83

mi.  
Gr.  
83



| Gr. | 7       |            |             |            |           |
|-----|---------|------------|-------------|------------|-----------|
| mn  | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus     |
| 0   | 1218693 | 21048049   | 20973231    | 74818      | 992546160 |
| 1   | 1221580 | 21024385   | 20949209    | 75176      | 992510659 |
| 2   | 1224467 | 21000779   | 20925245    | 75534      | 992475058 |
| 3   | 1227354 | 20977230   | 20901337    | 75893      | 992439357 |
| 4   | 1230241 | 20953738   | 20877485    | 76253      | 992403656 |
| 5   | 1233128 | 20930302   | 20853688    | 76614      | 992367855 |
| 6   | 1236015 | 20906922   | 20829946    | 76976      | 992331954 |
| 7   | 1238901 | 20883595   | 20806256    | 77339      | 992295953 |
| 8   | 1241788 | 20860323   | 20782620    | 77703      | 992259952 |
| 9   | 1244674 | 20837106   | 20759038    | 78068      | 992223951 |
| 10  | 1247560 | 20813945   | 20735512    | 78433      | 992187950 |
| 11  | 1250446 | 20790838   | 20712039    | 78799      | 992151949 |
| 12  | 1253332 | 20767785   | 20688619    | 79166      | 992115948 |
| 13  | 1256218 | 20744785   | 20665251    | 79534      | 992079947 |
| 14  | 1259104 | 20721838   | 20641945    | 79903      | 992043946 |
| 15  | 1261990 | 20698946   | 20618946    | 80272      | 992007945 |
| 16  | 1264876 | 20676107   | 20595945    | 80642      | 991971944 |
| 17  | 1267761 | 20653321   | 20572908    | 81013      | 991935943 |
| 18  | 1270647 | 20630588   | 20549203    | 81385      | 991899942 |
| 19  | 1273532 | 20607906   | 20526148    | 81758      | 991863941 |
| 20  | 1276417 | 20585278   | 20503146    | 82132      | 991827940 |
| 21  | 1279302 | 20562701   | 20480194    | 82507      | 991791939 |
| 22  | 1282187 | 20540176   | 20457293    | 82883      | 991755938 |
| 23  | 1285072 | 20517703   | 20434444    | 83259      | 991719937 |
| 24  | 1287957 | 20495281   | 20411645    | 83636      | 991683936 |
| 25  | 1290841 | 20472909   | 20388825    | 84014      | 991647935 |
| 26  | 1293726 | 20450587   | 20366194    | 84393      | 991611934 |
| 27  | 1296610 | 20428316   | 20343543    | 84773      | 991575933 |
| 28  | 1299494 | 20406096   | 20320942    | 85154      | 991539932 |
| 29  | 1302378 | 20383925   | 20298389    | 85536      | 991503931 |
| 30  | 1305262 | 20361806   | 20275887    | 85919      | 991467930 |

| Gr. | 7       |            |             |            |           |
|-----|---------|------------|-------------|------------|-----------|
| mn  | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus     |
| 30  | 1308146 | 20339737   | 20253435    | 86302      | 991431929 |
| 31  | 1311030 | 20317717   | 20231031    | 86686      | 991395928 |
| 32  | 1313914 | 20295746   | 20208675    | 87071      | 991359927 |
| 33  | 1316798 | 20273822   | 20186365    | 87457      | 991323926 |
| 34  | 1319681 | 20251947   | 20164103    | 87844      | 991287925 |
| 35  | 1322564 | 20230120   | 20141888    | 88232      | 991251924 |
| 36  | 1325447 | 20208341   | 20119710    | 88621      | 991215923 |
| 37  | 1328330 | 20186611   | 20097600    | 89011      | 991179922 |
| 38  | 1331213 | 20164931   | 20075530    | 89401      | 991143921 |
| 39  | 1334096 | 20143301   | 20053509    | 89792      | 991107920 |
| 40  | 1336979 | 20121717   | 20031533    | 90184      | 991071919 |
| 41  | 1339862 | 20100180   | 20009603    | 90577      | 991035918 |
| 42  | 1342744 | 20078689   | 19987718    | 90971      | 991000917 |
| 43  | 1345627 | 20057245   | 19965880    | 91365      | 990964916 |
| 44  | 1348509 | 20035846   | 19944086    | 91760      | 990928915 |
| 45  | 1351392 | 20014494   | 19922338    | 92156      | 990892914 |
| 46  | 1354274 | 19993189   | 19900636    | 92553      | 990856913 |
| 47  | 1357156 | 19971931   | 19878980    | 92951      | 990820912 |
| 48  | 1360038 | 19950718   | 19857368    | 93350      | 990784911 |
| 49  | 1362920 | 19929552   | 19835852    | 93750      | 990748910 |
| 50  | 1365802 | 19908432   | 19814281    | 94151      | 990712909 |
| 51  | 1368683 | 19887357   | 19792805    | 94552      | 990676908 |
| 52  | 1371564 | 19866327   | 19771373    | 94954      | 990640907 |
| 53  | 1374446 | 19845341   | 19749984    | 95357      | 990604906 |
| 54  | 1377327 | 19824400   | 19728639    | 95761      | 990568905 |
| 55  | 1380208 | 19803504   | 19707338    | 96166      | 990532904 |
| 56  | 1383089 | 19782652   | 19686080    | 96572      | 990496903 |
| 57  | 1385970 | 19761844   | 19664865    | 96979      | 990460902 |
| 58  | 1388851 | 19741081   | 19643694    | 97387      | 990424901 |
| 59  | 1391731 | 19720362   | 19622566    | 97796      | 990388900 |
| 60  |         |            |             |            | 990352900 |



Gr.

3

| min | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 1391731 | 19720362   | 19622566    | 97796      | 9902681 |
| 1   | 1394612 | 19699687   | 19601482    | 98105      | 9902276 |
| 2   | 1397492 | 19679054   | 19580435    | 98615      | 9901870 |
| 3   | 1400373 | 19658464   | 19559438    | 99026      | 9901463 |
| 4   | 1403253 | 19637917   | 19538479    | 99438      | 9901055 |
| 5   | 1406133 | 19617413   | 19517562    | 99851      | 9900646 |
| 6   | 1409013 | 19596952   | 19496687    | 100265     | 9900237 |
| 7   | 1411893 | 19576535   | 19475756    | 100679     | 9899827 |
| 8   | 1414772 | 19556160   | 19455066    | 101094     | 9899416 |
| 9   | 1417652 | 19535827   | 19434317    | 101510     | 9899004 |
| 10  | 1420531 | 19515538   | 19413611    | 101927     | 9898591 |
| 11  | 1423410 | 19495290   | 19392945    | 102345     | 9898177 |
| 12  | 1426289 | 19475084   | 19372320    | 102764     | 9897762 |
| 13  | 1429168 | 19454918   | 19351734    | 103184     | 9897347 |
| 14  | 1432047 | 19434794   | 19331190    | 103604     | 9896931 |
| 15  | 1434926 | 19414711   | 19310686    | 104025     | 9896514 |
| 16  | 1437805 | 19394669   | 19290222    | 104447     | 9896096 |
| 17  | 1440684 | 19374668   | 19269798    | 104870     | 9895677 |
| 18  | 1443562 | 19354708   | 19249414    | 105294     | 9895257 |
| 19  | 1446441 | 19334787   | 19229068    | 105719     | 9894837 |
| 20  | 1449319 | 19314908   | 19208763    | 106145     | 9894416 |
| 21  | 1452197 | 19295052   | 19188501    | 106571     | 9893994 |
| 22  | 1455075 | 19275275   | 19168277    | 106998     | 9893571 |
| 23  | 1457953 | 19255517   | 19148091    | 107426     | 9893147 |
| 24  | 1460831 | 19235798   | 19127943    | 107855     | 9892723 |
| 25  | 1463708 | 19216118   | 19107833    | 108285     | 9892298 |
| 26  | 1466586 | 19196477   | 19087761    | 108716     | 9891872 |
| 27  | 1469463 | 19176875   | 19067727    | 109148     | 9891445 |
| 28  | 1472340 | 19157313   | 19047732    | 109581     | 9891017 |
| 29  | 1475217 | 19137792   | 19027777    | 110015     | 9890588 |
| 30  | 1478094 | 19118310   | 19007861    | 110449     | 9890159 |

81

Gr.

8

| min | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 1478094 | 19118310   | 19007861    | 110449     | 9890159 |
| 31  | 1480971 | 19098865   | 18987981    | 110884     | 9889729 |
| 32  | 1483848 | 19079459   | 18968139    | 111320     | 9889298 |
| 33  | 1486724 | 19060091   | 18908334    | 111757     | 988886  |
| 34  | 1489601 | 19040761   | 18928566    | 112195     | 9888433 |
| 35  | 1492477 | 19021469   | 18908835    | 112634     | 9887999 |
| 36  | 1495353 | 19002215   | 18889141    | 113074     | 9887564 |
| 37  | 1498229 | 18982999   | 18869485    | 113514     | 9887128 |
| 38  | 1501105 | 18963822   | 18849867    | 113955     | 9886692 |
| 39  | 1503981 | 18944682   | 18830285    | 114397     | 9886255 |
| 40  | 1506857 | 18925581   | 18810741    | 114840     | 9885817 |
| 41  | 1509733 | 18906517   | 18791233    | 115284     | 9885378 |
| 42  | 1512608 | 18887489   | 18771760    | 115729     | 9884938 |
| 43  | 1515484 | 18868498   | 18752323    | 116175     | 9884498 |
| 44  | 1518359 | 18849543   | 18732921    | 116622     | 9884057 |
| 45  | 1521234 | 18830625   | 18713556    | 117069     | 9883615 |
| 46  | 1524109 | 18811744   | 18694227    | 117517     | 9883172 |
| 47  | 1526984 | 18792899   | 18674933    | 117966     | 9882728 |
| 48  | 1529859 | 18774090   | 18655674    | 118416     | 9882283 |
| 49  | 1532734 | 18755318   | 18636451    | 118867     | 9881838 |
| 50  | 1535608 | 18736581   | 18617262    | 119319     | 9881392 |
| 51  | 1538482 | 18717882   | 18598111    | 119771     | 9880945 |
| 52  | 1541356 | 18699218   | 18578994    | 120224     | 9880497 |
| 53  | 1544230 | 18680589   | 18559911    | 120678     | 9880048 |
| 54  | 1547104 | 18661995   | 18540862    | 121133     | 9879598 |
| 55  | 1549978 | 18643437   | 18521848    | 121589     | 9879148 |
| 56  | 1552852 | 18624915   | 18502869    | 122046     | 9878697 |
| 57  | 1555725 | 18606428   | 18483924    | 122504     | 9878245 |
| 58  | 1558599 | 18587975   | 18465013    | 122962     | 9877792 |
| 59  | 1561472 | 18569557   | 18446136    | 123421     | 9877338 |
| 60  | 1564345 | 18551174   | 18427293    | 123881     | 9876883 |

C 2

81

mi.

Gr.

8.



| Gr. | 9       |            |             |            |         |
|-----|---------|------------|-------------|------------|---------|
| min | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
| 0   | 1564345 | 18551174   | 18427293    | 123881     | 9876833 |
| 1   | 1567218 | 18532816   | 18408484    | 124342     | 9876427 |
| 2   | 1570091 | 18514511   | 18389707    | 124804     | 9875971 |
| 3   | 1572964 | 18496231   | 18370964    | 125267     | 9875514 |
| 4   | 1575837 | 18477984   | 18352253    | 125731     | 9875056 |
| 5   | 1578709 | 18459772   | 18333576    | 126196     | 9874597 |
| 6   | 1581681 | 18441524   | 18314933    | 126661     | 9874137 |
| 7   | 1584453 | 18423451   | 18296324    | 127127     | 9873677 |
| 8   | 1587325 | 18405341   | 18277747    | 127594     | 9873216 |
| 9   | 1590197 | 18387265   | 18259203    | 128062     | 9872754 |
| 10  | 1593069 | 18369223   | 18240692    | 128531     | 9872291 |
| 11  | 1595941 | 18351214   | 18222213    | 129001     | 9871827 |
| 12  | 1598812 | 18333237   | 18203765    | 129472     | 9871362 |
| 13  | 1601684 | 18315294   | 18185351    | 129943     | 9870897 |
| 14  | 1604555 | 18297384   | 18166969    | 130415     | 9870431 |
| 15  | 1607426 | 18279507   | 18148619    | 130888     | 9869964 |
| 16  | 1610297 | 18261663   | 18130301    | 131362     | 9869496 |
| 17  | 1613168 | 18243851   | 18112014    | 131837     | 9869027 |
| 18  | 1616038 | 18226071   | 18093758    | 132313     | 9868557 |
| 19  | 1618909 | 18208323   | 18075533    | 132790     | 9868087 |
| 20  | 1621779 | 18190606   | 18057338    | 133268     | 9867616 |
| 21  | 1624649 | 18172624   | 18039177    | 133747     | 9867144 |
| 22  | 1627519 | 18155273   | 18021047    | 134226     | 9866671 |
| 23  | 1630389 | 18137655   | 18002948    | 134706     | 9866197 |
| 24  | 1633259 | 18120067   | 17984880    | 135187     | 9865722 |
| 25  | 1636129 | 18102511   | 17966842    | 135669     | 9865246 |
| 26  | 1638999 | 18084987   | 17948835    | 136152     | 9864770 |
| 27  | 1641868 | 18067495   | 17930859    | 136636     | 9864293 |
| 28  | 1644738 | 18050004   | 17912913    | 137121     | 9863815 |
| 29  | 1647607 | 18032604   | 17894997    | 137607     | 9863336 |
| 30  | 1650476 | 18015207   | 17877114    | 138093     | 9862856 |

80

80

| Gr. | 9       |            |             |            |         |
|-----|---------|------------|-------------|------------|---------|
| min | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
| 30  | 1650476 | 18015207   | 17877114    | 138093     | 9862856 |
| 31  | 1653345 | 17997839   | 17859259    | 138580     | 9862376 |
| 32  | 1656214 | 17980503   | 17841435    | 139068     | 9861895 |
| 33  | 1659082 | 17963198   | 17823641    | 139557     | 9861413 |
| 34  | 1661951 | 17945922   | 17805875    | 140047     | 9860930 |
| 35  | 1664819 | 17928677   | 17788139    | 140538     | 9860446 |
| 36  | 1667687 | 17911463   | 17770433    | 141030     | 9859961 |
| 37  | 1670555 | 17894281   | 17752759    | 141522     | 9859475 |
| 38  | 1673423 | 17877128   | 17735113    | 142015     | 9858989 |
| 39  | 1676291 | 17860006   | 17717497    | 142509     | 9858502 |
| 40  | 1679159 | 17842915   | 17699911    | 143004     | 9858014 |
| 41  | 1682027 | 17825852   | 17682352    | 143500     | 9857525 |
| 42  | 1684894 | 17808820   | 17664823    | 143997     | 9857035 |
| 43  | 1687761 | 17791817   | 17647322    | 144495     | 9856544 |
| 44  | 1690628 | 17774843   | 17629849    | 144994     | 9856053 |
| 45  | 1693495 | 17757899   | 17612406    | 145493     | 9855561 |
| 46  | 1696362 | 17740985   | 17594992    | 145993     | 9855068 |
| 47  | 1699229 | 17724100   | 17577606    | 146494     | 9854574 |
| 48  | 1702095 | 17707244   | 17560248    | 146996     | 9854079 |
| 49  | 1704962 | 17690418   | 17542919    | 147499     | 9853583 |
| 50  | 1707828 | 17673622   | 17525619    | 148003     | 9853087 |
| 51  | 1710694 | 17656856   | 17508349    | 148507     | 9852590 |
| 52  | 1713560 | 17640118   | 17491106    | 149012     | 9852092 |
| 53  | 1716426 | 17623408   | 17473890    | 149518     | 9851593 |
| 54  | 1719292 | 17606726   | 17456701    | 150025     | 9851093 |
| 55  | 1722157 | 17590073   | 17439540    | 150533     | 9850593 |
| 56  | 1725022 | 17573448   | 17422406    | 151042     | 9850092 |
| 57  | 1727887 | 17556851   | 17405299    | 151552     | 9849590 |
| 58  | 1730752 | 17540283   | 17388220    | 152063     | 9849087 |
| 59  | 1733617 | 17523744   | 17371169    | 152575     | 9848583 |
| 60  | 1736482 | 17507234   | 17354146    | 153088     | 9848078 |

C 3

83

mi.  
Gr.  
80



| Gr. | 10      |            |             |            |         |
|-----|---------|------------|-------------|------------|---------|
| 10  |         |            |             |            |         |
| min | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
| 0   | 1736482 | 17507234   | 17354146    | 153088     | 9848078 |
| 1   | 1739347 | 17490751   | 17337150    | 153601     | 9847572 |
| 2   | 1742211 | 17474296   | 17320181    | 154115     | 9847066 |
| 3   | 1745075 | 17457869   | 17303239    | 154630     | 9846559 |
| 4   | 1747939 | 17441470   | 17286324    | 155146     | 9846051 |
| 5   | 1750803 | 17425098   | 17269435    | 155663     | 9845542 |
| 6   | 1753667 | 17408754   | 17252573    | 156181     | 9845032 |
| 7   | 1756531 | 17392438   | 17235738    | 156700     | 9844521 |
| 8   | 1759394 | 17376149   | 17218929    | 157220     | 9844010 |
| 9   | 1762258 | 17359837   | 17202147    | 157740     | 9843498 |
| 10  | 1765121 | 17343652   | 17185391    | 158261     | 9842985 |
| 11  | 1767984 | 17327444   | 17168661    | 158783     | 9842471 |
| 12  | 1770847 | 17311263   | 17151957    | 159306     | 9841956 |
| 13  | 1773710 | 17295109   | 17135279    | 159830     | 9841440 |
| 14  | 1776573 | 17278982   | 17118627    | 160355     | 9840924 |
| 15  | 1779435 | 17262882   | 17102001    | 160881     | 9840407 |
| 16  | 1782298 | 17246809   | 17085401    | 161408     | 9839889 |
| 17  | 1785160 | 17230762   | 17068827    | 161935     | 9839370 |
| 18  | 1788022 | 17214742   | 17052279    | 162463     | 9838850 |
| 19  | 1790884 | 17198749   | 17035757    | 162992     | 9838329 |
| 20  | 1793746 | 17182783   | 17019261    | 163522     | 9837808 |
| 21  | 1796608 | 17166843   | 17002790    | 164053     | 9837286 |
| 22  | 1799469 | 17150929   | 16986344    | 164585     | 9836763 |
| 23  | 1802331 | 17135041   | 16969924    | 165117     | 9836239 |
| 24  | 1805192 | 17119179   | 16953529    | 165650     | 9835714 |
| 25  | 1808053 | 17103342   | 16937158    | 166184     | 9835189 |
| 26  | 1810914 | 17087531   | 16920812    | 166719     | 9834663 |
| 27  | 1813774 | 17071746   | 16904491    | 167255     | 9834136 |
| 28  | 1816634 | 17055987   | 16888195    | 167792     | 9833608 |
| 29  | 1819495 | 17040254   | 16871924    | 168330     | 9833079 |
| 30  | 1822355 | 17024542   | 16855678    | 168869     | 9832549 |

| Gr. | 10      |            |             |            |         |
|-----|---------|------------|-------------|------------|---------|
| 10  |         |            |             |            |         |
| min | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
| 30  | 1822355 | 17024542   | 16855678    | 168869     | 9832549 |
| 31  | 1825215 | 17008866   | 16839458    | 169408     | 9832019 |
| 32  | 1828075 | 16993210   | 16823262    | 169948     | 9831488 |
| 33  | 1830935 | 16977579   | 16807090    | 170489     | 9830956 |
| 34  | 1833795 | 16961973   | 16790942    | 171031     | 9830423 |
| 35  | 1836654 | 16946392   | 16774818    | 171574     | 9829889 |
| 36  | 1839513 | 16930836   | 16758718    | 172118     | 9829354 |
| 37  | 1842372 | 16915305   | 16742642    | 172663     | 9828818 |
| 38  | 1845231 | 16899799   | 16726590    | 173209     | 9828282 |
| 39  | 1848090 | 16884317   | 16710561    | 173756     | 9827745 |
| 40  | 1850949 | 16868860   | 16694557    | 174303     | 9827207 |
| 41  | 1853808 | 16853428   | 16678577    | 174851     | 9826667 |
| 42  | 1856666 | 16838021   | 16662621    | 175400     | 9826128 |
| 43  | 1859524 | 16822638   | 16646688    | 175950     | 9825587 |
| 44  | 1862382 | 16807280   | 16630779    | 176501     | 9825046 |
| 45  | 1865240 | 16791946   | 16614893    | 177053     | 9824504 |
| 46  | 1868098 | 16776636   | 16599030    | 177606     | 9823961 |
| 47  | 1870956 | 16761351   | 16583191    | 178160     | 9823417 |
| 48  | 1873813 | 16746090   | 16567375    | 178715     | 9822872 |
| 49  | 1876670 | 16730853   | 16551583    | 179270     | 9822327 |
| 50  | 1879527 | 16715640   | 16535814    | 179826     | 9821781 |
| 51  | 1882384 | 16700451   | 16520068    | 180383     | 9821234 |
| 52  | 1885241 | 16685286   | 16504345    | 180941     | 9820686 |
| 53  | 1888098 | 16670145   | 16488645    | 181500     | 9820137 |
| 54  | 1890954 | 16655028   | 16472968    | 182060     | 9819587 |
| 55  | 1893810 | 16639934   | 16457313    | 182621     | 9819037 |
| 56  | 1896666 | 16624864   | 16441681    | 183183     | 9818486 |
| 57  | 1899522 | 16609817   | 16426072    | 183745     | 9817934 |
| 58  | 1902378 | 16594794   | 16410486    | 184308     | 9817381 |
| 59  | 1905234 | 16579794   | 16394922    | 184872     | 9816827 |
| 60  | 1908090 | 16564818   | 16379381    | 185437     | 9816272 |



| Gr. | 11      |            |             |            |            |
|-----|---------|------------|-------------|------------|------------|
| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus      |
| 0   | 1908090 | 16564818   | 16379381    | 185437     | 9816272 60 |
| 1   | 1910945 | 16549865   | 16363862    | 186003     | 9815716 59 |
| 2   | 1913800 | 16534935   | 16348365    | 186570     | 9815160 58 |
| 3   | 1916655 | 16520028   | 16332890    | 187138     | 9814603 57 |
| 4   | 1919510 | 16505144   | 16317438    | 187706     | 9814045 56 |
| 5   | 1922365 | 16490283   | 16302008    | 177275     | 9813486 55 |
| 6   | 1925220 | 16475445   | 16286600    | 188845     | 9812926 54 |
| 7   | 1928074 | 16460630   | 16271214    | 189416     | 9812366 53 |
| 8   | 1930928 | 16445837   | 16255849    | 189988     | 9811805 52 |
| 9   | 1933782 | 16431067   | 16240506    | 190561     | 9811243 51 |
| 10  | 1936636 | 16416320   | 16225185    | 191135     | 9810680 50 |
| 11  | 1939490 | 16401596   | 16209886    | 191710     | 9810116 49 |
| 12  | 1942344 | 16386895   | 16194610    | 192285     | 9809551 48 |
| 13  | 1945197 | 16372216   | 16179355    | 192861     | 9808986 47 |
| 14  | 1948050 | 16357559   | 16164121    | 193438     | 9808420 46 |
| 15  | 1950903 | 16342924   | 16148908    | 194016     | 9807853 45 |
| 16  | 1953756 | 16328311   | 16133716    | 194595     | 9807285 44 |
| 17  | 1956609 | 16313720   | 16118545    | 195175     | 9806716 43 |
| 18  | 1959462 | 16299151   | 16103395    | 195756     | 9806147 42 |
| 19  | 1962314 | 16284604   | 16088266    | 196338     | 9805577 41 |
| 20  | 1965166 | 16270079   | 16073159    | 196920     | 9805006 40 |
| 21  | 1968018 | 16255576   | 16058073    | 197503     | 9804434 39 |
| 22  | 1970870 | 16241095   | 16043008    | 198087     | 9803861 38 |
| 23  | 1973722 | 16226636   | 16027964    | 198672     | 9803287 37 |
| 24  | 1976574 | 16212198   | 16012940    | 199258     | 9802712 36 |
| 25  | 1979425 | 16197782   | 15997937    | 199845     | 9802137 35 |
| 26  | 1982276 | 16183388   | 15982955    | 200433     | 9801561 34 |
| 27  | 1985127 | 16169016   | 15967994    | 201022     | 9800984 33 |
| 28  | 1987978 | 16154665   | 15953053    | 201612     | 9800406 32 |
| 29  | 1990829 | 16140336   | 15938133    | 202203     | 9799827 31 |
| 30  | 1993679 | 16126028   | 15923233    | 202795     | 9799247 30 |

| Gr. | ui      |            |             |            |            |
|-----|---------|------------|-------------|------------|------------|
| min | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus      |
| 30  | 1996530 | 16111742   | 15908355    | 203387     | 9798667 29 |
| 31  | 1999380 | 16097477   | 1589497     | 203980     | 9798086 28 |
| 32  | 2002230 | 16083232   | 1587858     | 204574     | 9797504 27 |
| 33  | 2005080 | 16069008   | 1586339     | 205169     | 9796921 26 |
| 34  | 2007930 | 16054805   | 15849040    | 205765     | 9796337 25 |
| 35  | 2010780 | 16040623   | 15834261    | 206362     | 9795753 24 |
| 36  | 2013629 | 16026462   | 15819502    | 206960     | 9795168 23 |
| 37  | 2016478 | 16012322   | 15804764    | 207558     | 9794582 22 |
| 38  | 2019327 | 15998203   | 15790046    | 208157     | 9793995 21 |
| 39  | 2022176 | 15984105   | 15775348    | 208757     | 9793407 20 |
| 40  | 2025025 | 15970028   | 15760670    | 209358     | 9792818 19 |
| 41  | 2027874 | 15955972   | 15746012    | 209960     | 9792228 18 |
| 42  | 2030722 | 15941936   | 15731373    | 210563     | 9791638 17 |
| 43  | 2033570 | 15927921   | 15716754    | 211167     | 9791047 16 |
| 44  | 2036418 | 15913926   | 15702154    | 211772     | 9790455 15 |
| 45  | 2039266 | 15899951   | 15687573    | 212378     | 9789862 14 |
| 46  | 2042114 | 15885996   | 15673012    | 212984     | 9789268 13 |
| 47  | 2044962 | 15872062   | 15658461    | 213591     | 9788674 12 |
| 48  | 2047809 | 15858148   | 15643949    | 214199     | 9788079 11 |
| 49  | 2050656 | 15844254   | 15629446    | 214808     | 9787483 10 |
| 50  | 2053503 | 15830371   | 15614953    | 215418     | 9786886 9  |
| 51  | 2056350 | 15816518   | 15600489    | 216029     | 9786288 8  |
| 52  | 2059197 | 15802685   | 15586044    | 216641     | 9785689 7  |
| 53  | 2062043 | 15788871   | 15571617    | 217254     | 9785090 6  |
| 54  | 2064889 | 15775077   | 15557200    | 217867     | 9784490 5  |
| 55  | 2067735 | 15761303   | 15542822    | 218481     | 9783889 4  |
| 56  | 2070581 | 15747559   | 15528463    | 219096     | 9783287 3  |
| 57  | 2073427 | 15733824   | 15514112    | 219712     | 9782684 2  |
| 58  | 2076272 | 15720109   | 15499780    | 220329     | 9782080 1  |
| 59  | 2079117 | 15706414   | 15485467    | 220947     | 9781470 0  |



| Gr. | 12      |            |             |            |            |
|-----|---------|------------|-------------|------------|------------|
| min | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus      |
| 0   | 2079117 | 15706414   | 15485467    | 220947     | 978147660  |
| 1   | 2081962 | 15692738   | 15471172    | 221566     | 978087159  |
| 2   | 2084807 | 15679082   | 15456896    | 222186     | 9780265158 |
| 3   | 2087652 | 15665445   | 15442639    | 222806     | 9779658157 |
| 4   | 2090497 | 15651828   | 15428401    | 223427     | 9779050156 |
| 5   | 2093342 | 15638230   | 15414181    | 224049     | 9778442155 |
| 6   | 2096180 | 15624651   | 15399979    | 224672     | 9777833154 |
| 7   | 2099030 | 15611092   | 15385796    | 225296     | 9777223153 |
| 8   | 2101874 | 15597552   | 15371631    | 225921     | 9776612152 |
| 9   | 2104718 | 15584031   | 15357484    | 226547     | 9776000151 |
| 10  | 2107562 | 15570530   | 15343356    | 227174     | 9775387150 |
| 11  | 2110405 | 15557048   | 15329246    | 227802     | 9774773149 |
| 12  | 2113248 | 15543585   | 15315155    | 228430     | 9774159148 |
| 13  | 2116091 | 15530141   | 15301082    | 229052     | 9773544147 |
| 14  | 2118934 | 15516715   | 15287026    | 229689     | 9772928146 |
| 15  | 2121777 | 15503308   | 15272988    | 230320     | 9772311145 |
| 16  | 2124620 | 15489920   | 15258968    | 230953     | 9771693144 |
| 17  | 2127462 | 15476551   | 15244966    | 231585     | 9771075143 |
| 18  | 2130304 | 15463200   | 15230981    | 232219     | 9770456142 |
| 19  | 2133146 | 15449868   | 15217014    | 232854     | 9769836141 |
| 20  | 2135988 | 15436554   | 15203064    | 233490     | 9769215140 |
| 21  | 2138830 | 15423259   | 15189133    | 234126     | 9768593139 |
| 22  | 2141671 | 15409982   | 15175219    | 234763     | 9767970138 |
| 23  | 2144512 | 15396724   | 15161323    | 235401     | 9767347137 |
| 24  | 2147353 | 15383484   | 15147444    | 236040     | 9766723136 |
| 25  | 2150194 | 15370262   | 15133582    | 236680     | 9766098135 |
| 26  | 2153035 | 15357059   | 15119738    | 237321     | 9765471134 |
| 27  | 2155876 | 15343874   | 15105911    | 237963     | 9764845133 |
| 28  | 2158716 | 15330708   | 15092102    | 238606     | 9764217132 |
| 29  | 2161556 | 15317560   | 15078310    | 239250     | 9763589131 |
| 30  | 2164396 | 15304430   | 15064535    | 239895     | 9762960130 |

| Gr. | 12      |            |             |            |            |
|-----|---------|------------|-------------|------------|------------|
| min | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus      |
| 30  | 2164396 | 15304430   | 15064535    | 239895     | 9762960130 |
| 31  | 2167236 | 15291319   | 15050779    | 240540     | 9762330129 |
| 32  | 2170076 | 15278226   | 15037040    | 241186     | 9761699128 |
| 33  | 2172916 | 15265150   | 15023317    | 241833     | 9761067127 |
| 34  | 2175755 | 15252092   | 15009611    | 242481     | 9760433126 |
| 35  | 2178594 | 15239052   | 14995922    | 243130     | 9759798125 |
| 36  | 2181433 | 15226030   | 14982250    | 243780     | 9759168124 |
| 37  | 2184272 | 15213025   | 14968594    | 244431     | 9758533123 |
| 38  | 2187111 | 15200038   | 14954955    | 245083     | 9757897122 |
| 39  | 2189949 | 15187068   | 14941333    | 245735     | 9757260121 |
| 40  | 2192787 | 15174116   | 14927728    | 246388     | 9756622120 |
| 41  | 2195625 | 15161182   | 14914140    | 247042     | 9755985119 |
| 42  | 2198463 | 15148266   | 14900569    | 247697     | 9755346118 |
| 43  | 2201300 | 15135367   | 14887014    | 248353     | 9754706117 |
| 44  | 2204137 | 15122485   | 14873475    | 249010     | 9754065116 |
| 45  | 2206974 | 15109621   | 14859953    | 249668     | 9753423115 |
| 46  | 2209811 | 15096774   | 14846447    | 250327     | 9752781114 |
| 47  | 2212648 | 15083944   | 14832957    | 250987     | 9752138113 |
| 48  | 2215485 | 15071132   | 14819485    | 251647     | 9751494112 |
| 49  | 2218322 | 15058337   | 14806029    | 252308     | 9750849111 |
| 50  | 2221158 | 15045559   | 14792589    | 252970     | 9750203110 |
| 51  | 2223994 | 15032799   | 14779166    | 253633     | 9749557109 |
| 52  | 2226830 | 15020056   | 14765759    | 254297     | 9748910108 |
| 53  | 2229666 | 15007330   | 14752368    | 254962     | 9748262107 |
| 54  | 2232502 | 14994620   | 14738992    | 255628     | 9747613106 |
| 55  | 2235337 | 14981927   | 14725632    | 256295     | 9746963105 |
| 56  | 2238172 | 14969251   | 14712288    | 256963     | 9746312104 |
| 57  | 2241007 | 14956592   | 14698960    | 257632     | 9745660103 |
| 58  | 2243842 | 14943950   | 14685649    | 258301     | 9745008102 |
| 59  | 2246677 | 14931325   | 14672354    | 258971     | 9744355101 |
| 60  | 2249511 | 14918717   | 14659075    | 259642     | 9743700100 |



Gr. 13

| 13 | sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|----|---------|------------|-------------|------------|---------|
| 0  | 2249511 | 14918717   | 14659075    | 259542     | 9743700 |
| 1  | 2252345 | 14906126   | 14645812    | 260314     | 9743045 |
| 2  | 2255179 | 14893551   | 14632564    | 260987     | 9742389 |
| 3  | 2258013 | 14880993   | 14619332    | 261661     | 9741733 |
| 4  | 2260847 | 14868452   | 14606116    | 262336     | 9741076 |
| 5  | 2263680 | 14855927   | 14592916    | 263011     | 9740418 |
| 6  | 2266513 | 14843419   | 14579732    | 263687     | 9739759 |
| 7  | 2269346 | 14830928   | 14566564    | 264364     | 9739099 |
| 8  | 2272179 | 14818453   | 14553411    | 265042     | 9738439 |
| 9  | 2275012 | 14805995   | 14540274    | 265721     | 9737778 |
| 10 | 2277844 | 14793553   | 14527152    | 266401     | 9737116 |
| 11 | 2280676 | 14781128   | 14514046    | 267082     | 9736453 |
| 12 | 2283508 | 14768719   | 14500955    | 267764     | 9735789 |
| 13 | 2286340 | 14756325   | 14487878    | 268447     | 9735124 |
| 14 | 2289172 | 14743947   | 14474817    | 269130     | 9734459 |
| 15 | 2292004 | 14731585   | 14461771    | 269814     | 9733793 |
| 16 | 2294835 | 14719239   | 14448740    | 270499     | 9733126 |
| 17 | 2297666 | 14706909   | 14435724    | 271185     | 9732458 |
| 18 | 2300497 | 14694595   | 14422723    | 271872     | 9731789 |
| 19 | 2303328 | 14682297   | 14409747    | 272560     | 9731120 |
| 20 | 2306159 | 14670015   | 14396766    | 273249     | 9730450 |
| 21 | 2308990 | 14657749   | 14383810    | 273939     | 9729779 |
| 22 | 2311819 | 14645498   | 14370868    | 274630     | 9729107 |
| 23 | 2314649 | 14633263   | 14357941    | 275322     | 9728434 |
| 24 | 2317479 | 14621044   | 14345019    | 276015     | 9727760 |
| 25 | 2320309 | 14608841   | 14332132    | 276709     | 9727085 |
| 26 | 2323138 | 14596654   | 14319250    | 277404     | 9726409 |
| 27 | 2325967 | 14584483   | 14306384    | 278099     | 9725733 |
| 28 | 2328799 | 14572328   | 14293533    | 278795     | 9725056 |
| 29 | 2331625 | 14560189   | 14280697    | 279492     | 9724378 |
| 30 | 2334454 | 14548066   | 14267876    | 280190     | 9723699 |

Gr. 13

| 13 | sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|----|---------|------------|-------------|------------|---------|
| 30 | 2337282 | 14535958   | 14255069    | 280889     | 9723020 |
| 31 | 2340110 | 14523866   | 14242277    | 281589     | 9722340 |
| 32 | 2342938 | 14511789   | 14229500    | 282289     | 9721659 |
| 33 | 2345766 | 14499727   | 14216737    | 282990     | 9720977 |
| 34 | 2348594 | 14487680   | 14203988    | 283692     | 9720294 |
| 35 | 2351421 | 14475648   | 14191253    | 284395     | 9719610 |
| 36 | 2354248 | 14463632   | 14178533    | 285099     | 9718926 |
| 37 | 2357075 | 14451631   | 14165827    | 285804     | 9718241 |
| 38 | 2359902 | 14439645   | 14153135    | 286510     | 9717555 |
| 39 | 2362729 | 14427674   | 14140457    | 287217     | 9716868 |
| 40 | 2365555 | 14415718   | 14127793    | 287925     | 9716180 |
| 41 | 2368381 | 14403777   | 14115143    | 288634     | 9715491 |
| 42 | 2371207 | 14391851   | 14102507    | 289344     | 9714802 |
| 43 | 2374033 | 14379941   | 14089887    | 290054     | 9714112 |
| 44 | 2376859 | 14368046   | 14077281    | 290765     | 9713421 |
| 45 | 2379684 | 14356166   | 14064689    | 291477     | 9712729 |
| 46 | 2382509 | 14344301   | 14052111    | 292190     | 9712038 |
| 47 | 2385334 | 14332451   | 14039547    | 292904     | 9711343 |
| 48 | 2388159 | 14320616   | 14026997    | 293619     | 9710649 |
| 49 | 2390983 | 14308796   | 14014461    | 294335     | 9709954 |
| 50 | 2393808 | 14296991   | 14001939    | 295052     | 9709258 |
| 51 | 2396632 | 14285200   | 13989430    | 295770     | 9708561 |
| 52 | 2399456 | 14273424   | 13976935    | 296489     | 9707863 |
| 53 | 2402280 | 14261662   | 13964453    | 297209     | 9707165 |
| 54 | 2405104 | 14249915   | 13951986    | 297929     | 9706466 |
| 55 | 2407927 | 14238182   | 13939532    | 298650     | 9705766 |
| 56 | 2410750 | 14226464   | 13927092    | 299372     | 9705065 |
| 57 | 2413573 | 14214761   | 13914666    | 300095     | 9704363 |
| 58 | 2416396 | 14203072   | 13902253    | 300819     | 9703660 |
| 59 | 2419219 | 14191398   | 13889854    | 301544     | 9702957 |
| 60 | 2422042 | 14179739   | 13877469    | 302269     | 9702254 |



Gr. 14

| 14<br>min | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----------|---------|------------|-------------|------------|---------|
| 0         | 2419219 | 14191398   | 13889854    | 301544     | 9702957 |
| 1         | 2422041 | 1417938    | 13877468    | 302270     | 9702253 |
| 2         | 2423863 | 14168092   | 13865095    | 302997     | 9701548 |
| 3         | 2427685 | 14156461   | 13852737    | 303724     | 9700842 |
| 4         | 2430507 | 14144844   | 13840392    | 304452     | 9700135 |
| 5         | 2433329 | 14133242   | 13828061    | 305181     | 9699428 |
| 6         | 2436150 | 14121654   | 13815743    | 305911     | 9698720 |
| 7         | 2438971 | 14110081   | 13803439    | 306642     | 9698011 |
| 8         | 2441792 | 14098522   | 13791148    | 307374     | 9697301 |
| 9         | 2444613 | 14086977   | 13778870    | 308107     | 9696590 |
| 10        | 2447434 | 14075447   | 13766606    | 308841     | 9695879 |
| 11        | 2450254 | 14063931   | 13754355    | 309576     | 9695167 |
| 12        | 2453074 | 14052429   | 13742117    | 310312     | 9694454 |
| 13        | 2455894 | 14040940   | 13729891    | 311049     | 9693740 |
| 14        | 2458714 | 14029465   | 13717679    | 311786     | 9693025 |
| 15        | 2461533 | 14018004   | 13705480    | 312524     | 9692309 |
| 16        | 2464352 | 14006557   | 13693294    | 313263     | 9691593 |
| 17        | 2467171 | 13995124   | 13681121    | 314003     | 9690876 |
| 18        | 2469990 | 13983705   | 13668961    | 314744     | 9690158 |
| 19        | 2472809 | 13972300   | 13656814    | 315486     | 9689439 |
| 20        | 2475628 | 13960909   | 13644680    | 316229     | 9688719 |
| 21        | 2478446 | 13949532   | 13632559    | 316973     | 9687998 |
| 22        | 2481264 | 13938168   | 13620450    | 317718     | 9687277 |
| 23        | 2484082 | 13926818   | 13608354    | 318464     | 9686555 |
| 24        | 2486900 | 13915482   | 13596272    | 319210     | 9685832 |
| 25        | 2489717 | 13904159   | 13584202    | 319957     | 9685108 |
| 26        | 2492534 | 13892850   | 13572145    | 320705     | 9684383 |
| 27        | 2495351 | 13881554   | 13560100    | 321454     | 9683657 |
| 28        | 2498168 | 13870272   | 13548068    | 322204     | 9682931 |
| 29        | 2500984 | 13859004   | 13536049    | 322955     | 9682204 |
| 30        | 2503800 | 13847749   | 13524042    | 323707     | 9681476 |

Gr. 14

| 14<br>min | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----------|---------|------------|-------------|------------|---------|
| 30        | 2503800 | 13847749   | 13524042    | 323707     | 9681476 |
| 31        | 2506626 | 13836508   | 13512048    | 324460     | 9680747 |
| 32        | 2509431 | 13825280   | 13500066    | 325214     | 9680017 |
| 33        | 2512248 | 13814066   | 13488097    | 325969     | 9679287 |
| 34        | 2515064 | 13802865   | 13476141    | 326724     | 9678556 |
| 35        | 2517879 | 13791678   | 13464198    | 327480     | 9677824 |
| 36        | 2520694 | 13780504   | 13452267    | 328237     | 9677091 |
| 37        | 2523509 | 13769343   | 13440348    | 328995     | 9676357 |
| 38        | 2526324 | 13758195   | 13428441    | 329754     | 9675623 |
| 39        | 2529138 | 13747061   | 13416547    | 330514     | 9674888 |
| 40        | 2531952 | 13735940   | 13404665    | 331275     | 9674152 |
| 41        | 2534766 | 13724833   | 13392796    | 332037     | 9673415 |
| 42        | 2537580 | 13713739   | 13380939    | 332800     | 9672677 |
| 43        | 2540393 | 13702658   | 13369094    | 333564     | 9671938 |
| 44        | 2543206 | 13691590   | 13357262    | 334328     | 9671199 |
| 45        | 2546019 | 13680535   | 13345442    | 335093     | 9670459 |
| 46        | 2548832 | 13669493   | 13333634    | 335859     | 9669718 |
| 47        | 2551645 | 13658464   | 13321838    | 336626     | 9668976 |
| 48        | 2554458 | 13647448   | 13310054    | 337394     | 9668233 |
| 49        | 2557270 | 13636445   | 13298282    | 338163     | 9667490 |
| 50        | 2560082 | 13625454   | 13286521    | 338933     | 9666746 |
| 51        | 2562894 | 13614476   | 13274772    | 339704     | 9666001 |
| 52        | 2565706 | 13603511   | 13263035    | 340476     | 9665255 |
| 53        | 2568517 | 13592559   | 13251310    | 341249     | 9664508 |
| 54        | 2571328 | 13581620   | 13239597    | 342023     | 9663761 |
| 55        | 2574139 | 13570694   | 13227896    | 342798     | 9663013 |
| 56        | 2576950 | 13559781   | 13216208    | 343573     | 9662264 |
| 57        | 2579760 | 13548880   | 13204531    | 344349     | 9661514 |
| 58        | 2582570 | 13537992   | 13192866    | 345126     | 9660763 |
| 59        | 2585380 | 13527117   | 13181213    | 345904     | 9660011 |
| 60        | 2588190 | 13516255   | 13169572    | 346683     | 9659258 |



Gr. 15

| 13<br>min | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus      |
|-----------|---------|------------|-------------|------------|------------|
| 0         | 2588190 | 13516255   | 13165572    | 346683     | 9659268 60 |
| 1         | 2591000 | 13505406   | 13157943    | 347463     | 9658505 59 |
| 2         | 2593809 | 13494570   | 1314626     | 348244     | 9657751 58 |
| 3         | 2596618 | 13483746   | 13134720    | 349026     | 9656996 57 |
| 4         | 2599427 | 13472934   | 13123126    | 349808     | 9656240 56 |
| 5         | 2603236 | 1346235    | 13111544    | 350591     | 9655484 55 |
| 6         | 2605045 | 13451348   | 13099973    | 351375     | 9654727 54 |
| 7         | 2607853 | 13440573   | 13088413    | 352160     | 9653969 53 |
| 8         | 2610661 | 13429810   | 13076864    | 352946     | 9653210 52 |
| 9         | 2613469 | 13419060   | 13065327    | 353733     | 9652450 51 |
| 10        | 2616277 | 13408322   | 13053801    | 354521     | 9651689 50 |
| 11        | 2619084 | 13397596   | 13042286    | 355310     | 9650927 49 |
| 12        | 2621891 | 13386883   | 13030783    | 356100     | 9650165 48 |
| 13        | 2624698 | 13376182   | 13019291    | 356891     | 9649402 47 |
| 14        | 2627505 | 13365493   | 13007810    | 357683     | 9648638 46 |
| 15        | 2630312 | 13354817   | 12996341    | 358476     | 9647873 45 |
| 16        | 2633118 | 13344153   | 12984883    | 359270     | 9647108 44 |
| 17        | 2635924 | 13333502   | 12973438    | 360064     | 9646342 43 |
| 18        | 2638730 | 13322863   | 12962004    | 360859     | 9645575 42 |
| 19        | 2641536 | 13312237   | 12950582    | 361655     | 9644807 41 |
| 20        | 2644342 | 13301623   | 12939171    | 362452     | 9644038 40 |
| 21        | 2647147 | 13291022   | 12927772    | 363250     | 9643268 39 |
| 22        | 2649952 | 13280432   | 12916383    | 364049     | 9642498 38 |
| 23        | 2652757 | 13269854   | 12905005    | 364849     | 9641727 37 |
| 24        | 2655562 | 13259288   | 12893638    | 365650     | 9640955 36 |
| 25        | 2658366 | 13248734   | 12882282    | 366452     | 9640182 35 |
| 26        | 2661170 | 13238191   | 12870936    | 367255     | 9639408 34 |
| 27        | 2663974 | 13227660   | 12859601    | 368059     | 9638633 33 |
| 28        | 2666777 | 13217141   | 12848278    | 368863     | 9637858 32 |
| 29        | 2669580 | 13206633   | 12836965    | 369668     | 9637082 31 |
| 30        | 2672383 | 13196137   | 12825663    | 370474     | 9636305 30 |

Gr. 15

| 15<br>mi | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus      |
|----------|---------|------------|-------------|------------|------------|
| 30       | 2672383 | 13196137   | 12825662    | 370474     | 9636305 30 |
| 31       | 2675186 | 13185653   | 12814372    | 371281     | 9635527 29 |
| 32       | 2677989 | 13175181   | 12803091    | 372089     | 9634748 28 |
| 33       | 2680792 | 13164721   | 12791823    | 372898     | 9633969 27 |
| 34       | 2683595 | 13154273   | 12780565    | 373708     | 9633189 26 |
| 35       | 2686397 | 13143837   | 12769318    | 374516     | 9632408 25 |
| 36       | 2689199 | 13133413   | 12758082    | 375331     | 9631626 24 |
| 37       | 2691001 | 13123000   | 12746856    | 376144     | 9630841 23 |
| 38       | 2694802 | 13112599   | 12735641    | 376958     | 9630059 22 |
| 39       | 2697603 | 13102210   | 12724438    | 377772     | 9629275 21 |
| 40       | 2700404 | 13091833   | 12713246    | 378587     | 9628490 20 |
| 41       | 2703205 | 13081468   | 12702065    | 379403     | 9627794 19 |
| 42       | 2706005 | 13071114   | 12690894    | 380220     | 9626997 18 |
| 43       | 2708805 | 13060771   | 12679733    | 381038     | 9626199 17 |
| 44       | 2711605 | 13050440   | 12668583    | 381857     | 9625399 16 |
| 45       | 2714405 | 13040120   | 12657443    | 382677     | 9624592 15 |
| 46       | 2717204 | 13029812   | 12646314    | 383498     | 9623772 14 |
| 47       | 2720003 | 13019515   | 12635195    | 384320     | 9622971 13 |
| 48       | 2722802 | 13009229   | 12624086    | 385143     | 9622179 12 |
| 49       | 2725601 | 12998955   | 12612988    | 385967     | 9621387 11 |
| 50       | 2728400 | 12988692   | 12601901    | 386791     | 9620594 10 |
| 51       | 2731198 | 12978441   | 12590825    | 387616     | 9619800 9  |
| 52       | 2733996 | 12968291   | 12579759    | 388442     | 9619005 8  |
| 53       | 2736794 | 12957972   | 12568793    | 389269     | 9618209 7  |
| 54       | 2739592 | 12947755   | 12557658    | 390097     | 9617413 6  |
| 55       | 2742389 | 12937549   | 12546623    | 390926     | 9616616 5  |
| 56       | 2745186 | 12927354   | 12535598    | 391756     | 9615818 4  |
| 57       | 2747983 | 12917171   | 12524584    | 392587     | 9615019 3  |
| 58       | 2750780 | 12906999   | 12513580    | 393419     | 9614219 2  |
| 59       | 2753577 | 12896838   | 12502586    | 394252     | 9613418 1  |
| 60       | 2756373 | 12886689   | 12491603    | 395086     | 9612617 0  |



Gr. 16

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 2756373 | 12886689   | 12491603    | 395086     | 9612617 |
| 1   | 2759169 | 12876551   | 12480630    | 395921     | 9611815 |
| 2   | 2761965 | 12866423   | 12469667    | 396756     | 9611012 |
| 3   | 2764761 | 12856306   | 12458714    | 397592     | 9610208 |
| 4   | 2767556 | 12846200   | 12447771    | 398429     | 9609403 |
| 5   | 2770351 | 12836105   | 12436838    | 399267     | 9608598 |
| 6   | 2773146 | 12826021   | 12425915    | 400106     | 9607792 |
| 7   | 2775941 | 12815948   | 12415002    | 400946     | 9606985 |
| 8   | 2778735 | 12805886   | 12404099    | 401787     | 9606177 |
| 9   | 2781529 | 12795835   | 12393206    | 402629     | 9605368 |
| 10  | 2784323 | 12785795   | 12382323    | 403472     | 9604559 |
| 11  | 2787117 | 12775766   | 12371450    | 404316     | 9603749 |
| 12  | 2789911 | 12765748   | 12360587    | 405161     | 9602938 |
| 13  | 2792704 | 12755741   | 12349734    | 406007     | 9602126 |
| 14  | 2795497 | 12745745   | 12338891    | 406884     | 9601313 |
| 15  | 2798290 | 12735760   | 12328059    | 407701     | 9600499 |
| 16  | 2801082 | 12725785   | 12317236    | 408549     | 9599685 |
| 17  | 2803874 | 12715821   | 12306423    | 409398     | 9598870 |
| 18  | 2806666 | 12705868   | 12295620    | 410248     | 9598054 |
| 19  | 2809458 | 12695926   | 12284827    | 411099     | 9597237 |
| 20  | 2812250 | 12685995   | 12274044    | 411951     | 9596419 |
| 21  | 2815041 | 12676075   | 12263271    | 412804     | 9595600 |
| 22  | 2817832 | 12666166   | 12252508    | 413658     | 9594781 |
| 23  | 2820623 | 12656267   | 12241754    | 414513     | 9593961 |
| 24  | 2823414 | 12646379   | 12231010    | 415369     | 9593140 |
| 25  | 2826244 | 12636501   | 12220275    | 416226     | 9592318 |
| 26  | 2828994 | 12626633   | 12209550    | 417083     | 9591495 |
| 27  | 2831784 | 12616776   | 12197835    | 417941     | 9590672 |
| 28  | 2834574 | 12606029   | 12188129    | 418800     | 9589848 |
| 29  | 2837364 | 12597093   | 12177433    | 419660     | 9589023 |
| 30  | 2040153 | 12587267   | 12166746    | 420521     | 9588197 |

Gr. 16

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 2840153 | 12587267   | 12166746    | 420521     | 9588197 |
| 31  | 2842942 | 12577452   | 12156069    | 421383     | 9587371 |
| 32  | 2845731 | 12567647   | 12145401    | 422246     | 9586544 |
| 33  | 2848520 | 12557853   | 12134743    | 423110     | 9585716 |
| 34  | 2851308 | 12548069   | 12124094    | 423975     | 9584887 |
| 35  | 2854096 | 12538296   | 12113455    | 424841     | 9584057 |
| 36  | 2856884 | 12528533   | 12102825    | 425708     | 9583226 |
| 37  | 2859672 | 12518780   | 12092204    | 426576     | 9582395 |
| 38  | 2862459 | 12509038   | 12081593    | 427445     | 9581563 |
| 39  | 2865246 | 12499306   | 12070992    | 428314     | 9580730 |
| 40  | 2868033 | 12489585   | 12060401    | 429184     | 9579896 |
| 41  | 2870819 | 12479874   | 12049819    | 430055     | 9579061 |
| 42  | 2873605 | 12470174   | 12039247    | 430927     | 9578225 |
| 43  | 2876391 | 12460484   | 12028684    | 431800     | 9577389 |
| 44  | 2879177 | 12450804   | 12018130    | 432674     | 9576552 |
| 45  | 2881963 | 12441134   | 12007585    | 433549     | 9575714 |
| 46  | 2884748 | 12431474   | 11997049    | 434425     | 9574875 |
| 47  | 2887533 | 12421824   | 11986522    | 435302     | 9574036 |
| 48  | 2890318 | 12412184   | 11976004    | 436180     | 9573196 |
| 49  | 2893103 | 12402554   | 11965495    | 437059     | 9572355 |
| 50  | 2895888 | 12392934   | 11954996    | 437938     | 9571513 |
| 51  | 2898672 | 12383324   | 11944506    | 438818     | 9570670 |
| 52  | 2901456 | 12373724   | 11934025    | 439699     | 9569826 |
| 53  | 2904240 | 12364134   | 11923553    | 440581     | 9568982 |
| 54  | 2907023 | 12354554   | 11913090    | 441464     | 9568137 |
| 55  | 2909806 | 12344984   | 11902636    | 442348     | 9567291 |
| 56  | 2912589 | 12335425   | 11892192    | 443233     | 9566444 |
| 57  | 2915371 | 12325876   | 11881757    | 444119     | 9565596 |
| 58  | 2918153 | 12316337   | 11871330    | 445007     | 9564747 |
| 59  | 2920935 | 12306808   | 11860912    | 445896     | 9563898 |
| 60  | 2923717 | 12297289   | 11850503    | 446786     | 9563048 |



Gr. 17

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus      |
|-----|---------|------------|-------------|------------|------------|
| 0   | 2923717 | 12297289   | 11850503    | 446786     | 9563048 60 |
| 1   | 2926499 | 12287780   | 11840104    | 447676     | 9562197 59 |
| 2   | 2929280 | 12278280   | 11829713    | 448567     | 9561345 58 |
| 3   | 2932061 | 12268790   | 11819331    | 449459     | 9560492 57 |
| 4   | 2934842 | 12259310   | 11808958    | 450352     | 9559639 56 |
| 5   | 2937623 | 12249840   | 11798594    | 451246     | 9558785 55 |
| 6   | 2940403 | 12240379   | 11788239    | 452140     | 9557930 54 |
| 7   | 2943183 | 12230928   | 11777893    | 453035     | 9557074 53 |
| 8   | 2945953 | 12221487   | 11767556    | 453931     | 9556217 52 |
| 9   | 2948743 | 12212056   | 11757228    | 454828     | 9555360 51 |
| 10  | 2951523 | 12202634   | 11746908    | 455726     | 9554502 50 |
| 11  | 2954302 | 12193222   | 11736597    | 456625     | 9553643 49 |
| 12  | 2957081 | 12183820   | 11726295    | 457525     | 9552783 48 |
| 13  | 2959860 | 12174427   | 11716001    | 458426     | 9551922 47 |
| 14  | 2962630 | 12165044   | 11705716    | 459328     | 9551061 46 |
| 15  | 2965416 | 12155671   | 11695440    | 460231     | 9550199 45 |
| 16  | 2968194 | 12146308   | 11685173    | 461135     | 9549336 44 |
| 17  | 2970972 | 12136954   | 11674914    | 462040     | 9548472 43 |
| 18  | 2973750 | 12127610   | 11664695    | 462945     | 9547607 42 |
| 19  | 2976527 | 12118276   | 11654425    | 463851     | 9546742 41 |
| 20  | 2979304 | 12108952   | 11644194    | 464758     | 9545876 40 |
| 21  | 2982081 | 12099637   | 11633971    | 465666     | 9545009 39 |
| 22  | 2984857 | 12090332   | 11623757    | 466575     | 9544141 38 |
| 23  | 2987633 | 12081036   | 11613551    | 467485     | 9543272 37 |
| 24  | 2990409 | 12071749   | 11603353    | 468396     | 9542403 36 |
| 25  | 2993185 | 12062472   | 11593164    | 469308     | 9541533 35 |
| 26  | 2995960 | 12053204   | 11582983    | 470221     | 9540662 34 |
| 27  | 2998735 | 12043945   | 11572810    | 471135     | 9539790 33 |
| 28  | 3001510 | 12034696   | 11562646    | 472050     | 9538917 32 |
| 29  | 3004284 | 12025456   | 11552490    | 472966     | 9538043 31 |
| 30  | 3007058 | 12016225   | 11542341    | 473884     | 9537169 30 |

Gr. 17

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus      |
|-----|---------|------------|-------------|------------|------------|
| 30  | 3008058 | 12016225   | 11542341    | 473884     | 9537169 30 |
| 31  | 3009832 | 12007004   | 11532202    | 474802     | 9536294 29 |
| 32  | 3011606 | 11997792   | 11522071    | 475721     | 9535418 28 |
| 33  | 3013380 | 11988589   | 11511948    | 476641     | 9534541 27 |
| 34  | 3015153 | 11979396   | 11501835    | 477561     | 9533664 26 |
| 35  | 3016926 | 11970212   | 11491730    | 478482     | 9532786 25 |
| 36  | 3018699 | 11961037   | 11481633    | 479404     | 9531907 24 |
| 37  | 3020472 | 11951872   | 11471545    | 480327     | 9531027 23 |
| 38  | 3022244 | 11942716   | 11461465    | 481251     | 9530146 22 |
| 39  | 3024016 | 11933569   | 11451393    | 482176     | 9529264 21 |
| 40  | 3025788 | 11924431   | 11441329    | 483102     | 9528382 20 |
| 41  | 3027559 | 11915303   | 11431274    | 484029     | 9527499 19 |
| 42  | 3029339 | 11906184   | 11421227    | 484957     | 9526615 18 |
| 43  | 3031101 | 11897074   | 11411188    | 485886     | 9525730 17 |
| 44  | 3032872 | 11887973   | 11401157    | 486816     | 9524844 16 |
| 45  | 3034643 | 11878881   | 11391134    | 487747     | 9523958 15 |
| 46  | 3036413 | 11869798   | 11381119    | 488679     | 9523071 14 |
| 47  | 3038183 | 11860724   | 11371113    | 489611     | 9522183 13 |
| 48  | 3039953 | 11851659   | 11361115    | 490544     | 9521294 12 |
| 49  | 3041723 | 11842603   | 11351125    | 491478     | 9520404 11 |
| 50  | 3043492 | 11833557   | 11341144    | 492413     | 9519514 10 |
| 51  | 3045261 | 11824520   | 11331171    | 493349     | 9518623 9  |
| 52  | 3047030 | 11815492   | 11321206    | 494286     | 9517731 8  |
| 53  | 3048798 | 11806473   | 11311249    | 495224     | 9516838 7  |
| 54  | 3050566 | 11797463   | 11301300    | 496163     | 9515944 6  |
| 55  | 3052334 | 11788461   | 11292358    | 497103     | 9515050 5  |
| 56  | 3054102 | 11779468   | 11283424    | 498044     | 9514155 4  |
| 57  | 3055869 | 11770484   | 11274498    | 498986     | 9513259 3  |
| 58  | 3057636 | 11761509   | 11265580    | 499929     | 9512362 2  |
| 59  | 3059403 | 11752543   | 11256670    | 500873     | 9511464 1  |
| 60  | 3061170 | 11743586   | 11247768    | 501818     | 9510565 0  |



Gr. 18

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 3090170 | 11743586   | 11241768    | 501818     | 9510565 |
| 1   | 3092936 | 11734638   | 11231874    | 502764     | 9509666 |
| 2   | 3095702 | 11725699   | 11221988    | 503711     | 9508766 |
| 3   | 3098468 | 11716768   | 11212109    | 504659     | 9507865 |
| 4   | 3101234 | 11707846   | 11202239    | 505607     | 9506963 |
| 5   | 3103999 | 11698933   | 11192377    | 506556     | 9506061 |
| 6   | 3106764 | 11690029   | 11182523    | 507506     | 9505158 |
| 7   | 3109529 | 11681133   | 11172676    | 508457     | 9504254 |
| 8   | 3112294 | 11672246   | 11162837    | 509409     | 9503349 |
| 9   | 3115058 | 11663368   | 11153006    | 510362     | 9502443 |
| 10  | 3117822 | 11654499   | 11143184    | 511316     | 9501536 |
| 11  | 3120586 | 11645638   | 11133367    | 512271     | 9500629 |
| 12  | 3123349 | 11636786   | 11123559    | 513227     | 9499721 |
| 13  | 3126112 | 11627943   | 11113759    | 514184     | 9498812 |
| 14  | 3128875 | 11619199   | 11103967    | 515142     | 9497902 |
| 15  | 3131639 | 11610283   | 11094182    | 516101     | 9496991 |
| 16  | 3134400 | 11601466   | 11084405    | 517061     | 9496080 |
| 17  | 3137162 | 11592658   | 11074637    | 518021     | 9495168 |
| 18  | 3139924 | 11583858   | 11064876    | 518982     | 9494255 |
| 19  | 3142686 | 11575067   | 11055123    | 519944     | 9493341 |
| 20  | 3145448 | 11566285   | 11045378    | 520907     | 9492427 |
| 21  | 3148209 | 11557511   | 11035640    | 521871     | 9491512 |
| 22  | 3150970 | 11548746   | 11025910    | 522836     | 9490596 |
| 23  | 3153731 | 11539989   | 11016178    | 523802     | 9489679 |
| 24  | 3156491 | 11531240   | 11006471    | 524769     | 9488761 |
| 25  | 3159251 | 11522500   | 10996763    | 525737     | 9487842 |
| 26  | 3162011 | 11513768   | 10987062    | 526706     | 9486923 |
| 27  | 3164770 | 11505045   | 10977369    | 527676     | 9486003 |
| 28  | 3167529 | 11496330   | 10967685    | 528647     | 9485082 |
| 29  | 3170288 | 11487624   | 10958004    | 529620     | 9484160 |
| 30  | 3173047 | 11478926   | 10948332    | 530594     | 9483237 |

Gr. 18

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 3175805 | 11470237   | 10938669    | 531568     | 9482314 |
| 31  | 3178563 | 11461556   | 10929013    | 532543     | 9481390 |
| 32  | 3181321 | 11452883   | 10919364    | 533519     | 9480465 |
| 33  | 3184079 | 11444219   | 10909723    | 534496     | 9479539 |
| 34  | 3186837 | 11435563   | 10900090    | 535473     | 9478612 |
| 35  | 3189594 | 11426915   | 10890464    | 536451     | 9477685 |
| 36  | 3192351 | 11418275   | 10880845    | 537430     | 9476757 |
| 37  | 3195108 | 11409644   | 10871234    | 538410     | 9475828 |
| 38  | 3197864 | 11401021   | 10861630    | 539391     | 9474898 |
| 39  | 3200620 | 11392406   | 10852033    | 540373     | 9473967 |
| 40  | 3203374 | 11383800   | 10842444    | 541356     | 9473035 |
| 41  | 3206130 | 11375202   | 10832862    | 542340     | 9472103 |
| 42  | 3208885 | 11366612   | 10823287    | 543325     | 9471170 |
| 43  | 3211640 | 11358030   | 10813819    | 544311     | 9470236 |
| 44  | 3214395 | 11349456   | 10804358    | 545298     | 9469301 |
| 45  | 3217150 | 11340891   | 10794905    | 546286     | 9468366 |
| 46  | 3219904 | 11332334   | 10785459    | 547275     | 9467430 |
| 47  | 3222658 | 11323785   | 10776020    | 548265     | 9466493 |
| 48  | 3225412 | 11315244   | 10766588    | 549256     | 9465555 |
| 49  | 3228165 | 11306711   | 10757162    | 550249     | 9464616 |
| 50  | 3230918 | 11298186   | 10747744    | 551242     | 9463677 |
| 51  | 3233671 | 11289670   | 10738334    | 552236     | 9462737 |
| 52  | 3236423 | 11281162   | 10728931    | 553231     | 9461796 |
| 53  | 3239175 | 11272662   | 10719536    | 554226     | 9460854 |
| 54  | 3241927 | 11264170   | 10710148    | 555222     | 9459911 |
| 55  | 3244679 | 11255686   | 10700767    | 556219     | 9458968 |
| 56  | 3247430 | 11247210   | 10691393    | 557217     | 9458024 |
| 57  | 3250181 | 11238742   | 10682026    | 558216     | 9457079 |
| 58  | 3252932 | 11230282   | 10672666    | 559216     | 9456133 |
| 59  | 3255682 | 11221830   | 10663313    | 560217     | 9455186 |
| 60  | 3258432 | 11213386   | 10653966    | 561219     | 9454237 |



Gr. 19

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 3255682 | 11221830   | 10661613    | 560217     | 9455186 |
| 1   | 3258432 | 11213386   | 10652167    | 561219     | 9454239 |
| 2   | 3261182 | 11204950   | 10642728    | 562222     | 9453291 |
| 3   | 3263931 | 11196522   | 10633296    | 563226     | 9452342 |
| 4   | 3266681 | 11188102   | 10623871    | 564231     | 9451392 |
| 5   | 3269439 | 12179690   | 10614453    | 565237     | 9450441 |
| 6   | 3272179 | 11171286   | 10605042    | 566244     | 9449490 |
| 7   | 3274927 | 11162889   | 10595637    | 567251     | 9448538 |
| 8   | 3277675 | 11154500   | 10586239    | 568291     | 9447585 |
| 9   | 3280423 | 11146119   | 10576849    | 569270     | 9446631 |
| 10  | 3283171 | 11137746   | 14567466    | 570280     | 9445676 |
| 11  | 3285918 | 11129381   | 10558090    | 571291     | 9444720 |
| 12  | 3288665 | 11121024   | 10548721    | 572303     | 9443764 |
| 13  | 3291412 | 11112675   | 10539359    | 573316     | 9442807 |
| 14  | 3294159 | 11104334   | 10530004    | 574330     | 9441849 |
| 15  | 3296906 | 11096000   | 10520655    | 575345     | 9440890 |
| 16  | 3299652 | 11087674   | 10511313    | 576361     | 9439931 |
| 17  | 3302398 | 11079356   | 10501997    | 577370     | 9438971 |
| 18  | 3305144 | 11071046   | 10492648    | 578398     | 9438010 |
| 19  | 3307889 | 11062744   | 10483326    | 579418     | 9437048 |
| 20  | 3310634 | 11054449   | 10474010    | 580439     | 9436085 |
| 21  | 3313379 | 11046162   | 10464702    | 581460     | 9435122 |
| 22  | 3316123 | 11037883   | 10455401    | 582482     | 9434158 |
| 23  | 3318867 | 11029612   | 10446107    | 583505     | 9433193 |
| 24  | 3321611 | 11021348   | 10436819    | 584529     | 9432227 |
| 25  | 3324355 | 11013092   | 10427538    | 585554     | 9431260 |
| 26  | 3327098 | 11004843   | 10418263    | 586580     | 9430293 |
| 27  | 3329841 | 10996602   | 10408995    | 587607     | 9429325 |
| 28  | 3332585 | 10988368   | 10399733    | 588635     | 9428356 |
| 29  | 3335327 | 10980142   | 10390479    | 589663     | 9427386 |
| 30  | 3338069 | 10971923   | 10381231    | 590692     | 9426415 |

Gr. 19

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 3338069 | 10971923   | 10381231    | 590692     | 9426415 |
| 31  | 3340811 | 10963712   | 10371990    | 591722     | 9425444 |
| 32  | 3343553 | 10955509   | 10362756    | 592753     | 9424472 |
| 33  | 3346294 | 10947313   | 10353523    | 593785     | 9423499 |
| 34  | 3349035 | 10939125   | 10344307    | 594818     | 9422525 |
| 35  | 3351776 | 10930944   | 10335092    | 595852     | 9421550 |
| 36  | 3354516 | 10922771   | 10325884    | 596887     | 9420575 |
| 37  | 3357256 | 10914606   | 10316682    | 597924     | 9419599 |
| 38  | 3359996 | 10906448   | 10307486    | 598962     | 9418622 |
| 39  | 3362736 | 10898298   | 10298297    | 600001     | 9417644 |
| 40  | 3365475 | 10890156   | 10289115    | 601041     | 9416665 |
| 41  | 3368214 | 10882021   | 10279940    | 602081     | 9415685 |
| 42  | 3370953 | 10873894   | 10270772    | 603122     | 9414705 |
| 43  | 3373691 | 10865774   | 10261610    | 604164     | 9413724 |
| 44  | 3376429 | 10857661   | 10252454    | 605207     | 9412742 |
| 45  | 3379167 | 10849555   | 10243304    | 606251     | 9411760 |
| 46  | 3381905 | 10841457   | 10234161    | 607296     | 9410777 |
| 47  | 3384642 | 10833366   | 10225024    | 608342     | 9409793 |
| 48  | 3387379 | 10825282   | 10215893    | 609389     | 9408808 |
| 49  | 3390116 | 10817206   | 10206770    | 610436     | 9407822 |
| 50  | 3392852 | 10809137   | 10197653    | 611484     | 9406836 |
| 51  | 3395588 | 10801075   | 10188542    | 612533     | 9405849 |
| 52  | 3398324 | 10793021   | 10179438    | 613583     | 9404861 |
| 53  | 3401060 | 10784974   | 10170340    | 614634     | 9403872 |
| 54  | 3403795 | 10776934   | 10161248    | 615686     | 9402882 |
| 55  | 3406530 | 10768902   | 10152162    | 616740     | 9401891 |
| 56  | 3409265 | 10760877   | 10143082    | 617795     | 9400900 |
| 57  | 3411999 | 10752860   | 10134009    | 618851     | 9399908 |
| 58  | 3414733 | 10744850   | 10124942    | 619908     | 9398915 |
| 59  | 3417467 | 10736847   | 10115881    | 620966     | 9397921 |
| 60  | 3420201 | 10728852   | 10106827    | 622025     | 9396926 |



Gr.

20

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 3420201 | 10728852   | 10106827    | 622025     | 9396926 |
| 1   | 3422934 | 10720865   | 10097781    | 623084     | 9395931 |
| 2   | 3425667 | 10712885   | 10088741    | 624144     | 9394935 |
| 3   | 3428400 | 10704912   | 10079707    | 625205     | 9393938 |
| 4   | 3431133 | 10696945   | 10070678    | 626267     | 9392940 |
| 5   | 3433865 | 10688984   | 10061654    | 627330     | 9391941 |
| 6   | 3436597 | 10681030   | 10052636    | 628394     | 9390942 |
| 7   | 3439329 | 10673085   | 10043616    | 629459     | 9389942 |
| 8   | 3442060 | 10665147   | 10034822    | 630525     | 9388941 |
| 9   | 3444791 | 10657216   | 10025624    | 631592     | 9387939 |
| 10  | 3447522 | 10649292   | 10016632    | 632660     | 9386937 |
| 11  | 3450253 | 10641375   | 10007646    | 633729     | 9385934 |
| 12  | 3452983 | 10633465   | 9998666     | 634799     | 9384930 |
| 13  | 3455713 | 10625562   | 9989692     | 635870     | 9383925 |
| 14  | 3458442 | 10617667   | 9980725     | 636942     | 9382919 |
| 15  | 3461171 | 10609779   | 9971764     | 638015     | 9381913 |
| 16  | 3463900 | 10601898   | 9962810     | 639088     | 9380906 |
| 17  | 3466629 | 10594024   | 9953862     | 640162     | 9379898 |
| 18  | 3469357 | 10586157   | 9944920     | 641237     | 9378889 |
| 19  | 3472085 | 10578297   | 9935984     | 642313     | 9377880 |
| 20  | 3474813 | 10570444   | 9927054     | 643390     | 9376870 |
| 21  | 3477540 | 10562598   | 9918130     | 644468     | 9375859 |
| 22  | 3480267 | 10554760   | 9909213     | 645547     | 9374847 |
| 23  | 3482994 | 10546929   | 9900302     | 646627     | 9373834 |
| 24  | 3485721 | 10539104   | 9891396     | 647708     | 9372820 |
| 25  | 3488447 | 10531286   | 9882496     | 648790     | 9371806 |
| 26  | 3491173 | 10523474   | 9873601     | 649873     | 9370791 |
| 27  | 3493899 | 10515669   | 9864711     | 650958     | 9369775 |
| 28  | 3496624 | 10507871   | 9855827     | 652044     | 9368758 |
| 29  | 3499343 | 10500080   | 9846949     | 653131     | 9367740 |
| 30  | 3502075 | 10492295   | 9838076     | 654219     | 9366722 |

Gr.

20

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 3502075 | 10492295   | 9838076     | 654219     | 9366722 |
| 31  | 3504799 | 10484516   | 9829209     | 655307     | 9365703 |
| 32  | 3507523 | 10476745   | 9820349     | 656396     | 9364683 |
| 33  | 3510247 | 10468981   | 9811495     | 657486     | 9363662 |
| 34  | 3512971 | 10461225   | 9802648     | 658577     | 9362640 |
| 35  | 3515694 | 10453476   | 9793807     | 659669     | 9361618 |
| 36  | 3518417 | 10445734   | 9784972     | 660762     | 9360595 |
| 37  | 3521140 | 10437999   | 9776143     | 661856     | 9359571 |
| 38  | 3523862 | 10430271   | 9767320     | 662951     | 9358546 |
| 39  | 3526584 | 10422550   | 9758503     | 664047     | 9357521 |
| 40  | 3529306 | 10414836   | 9749693     | 665143     | 9356495 |
| 41  | 3532027 | 10407129   | 9740889     | 666240     | 9355468 |
| 42  | 3534748 | 10399429   | 9732091     | 667338     | 9354440 |
| 43  | 3537469 | 10391735   | 9723298     | 668437     | 9353411 |
| 44  | 3540190 | 10384047   | 9714510     | 669537     | 9352382 |
| 45  | 3542910 | 10376366   | 9705728     | 670638     | 9351352 |
| 46  | 3545630 | 10368692   | 9696951     | 671741     | 9350321 |
| 47  | 3548350 | 10361024   | 9688179     | 672845     | 9349289 |
| 48  | 3551070 | 10353362   | 9679412     | 673950     | 9348257 |
| 49  | 3553789 | 10345706   | 9670650     | 675056     | 9347224 |
| 50  | 3556508 | 10338057   | 9661894     | 676163     | 9346192 |
| 51  | 3559227 | 10330415   | 9653144     | 677271     | 9345159 |
| 52  | 3561945 | 10322780   | 9644400     | 678380     | 9344129 |
| 53  | 3564663 | 10315152   | 9635662     | 679490     | 9343098 |
| 54  | 3567380 | 10307531   | 9626930     | 680601     | 9342065 |
| 55  | 3570097 | 10299916   | 9618204     | 681712     | 9341037 |
| 56  | 3572814 | 10292308   | 9609484     | 682824     | 9340008 |
| 57  | 3575531 | 10284707   | 9600770     | 683937     | 9338978 |
| 58  | 3578247 | 10277113   | 9592062     | 685051     | 9337947 |
| 59  | 3580963 | 10269526   | 9583360     | 686166     | 9336916 |
| 60  | 3583679 | 10261946   | 9574664     | 687282     | 9335884 |



Gr.

21

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 3583679 | 10261946   | 9574664     | 687182     | 9335804 |
| 1   | 3586395 | 10254372   | 6565273     | 688399     | 9334761 |
| 2   | 3589110 | 10246804   | 9557287     | 689517     | 9333717 |
| 3   | 3591825 | 10239243   | 9548607     | 690636     | 9332673 |
| 4   | 3594540 | 10231688   | 9539932     | 691756     | 9331628 |
| 5   | 3597254 | 10224140   | 9531263     | 692877     | 9330582 |
| 6   | 3599968 | 10216598   | 9522599     | 693999     | 9329535 |
| 7   | 3602682 | 10209063   | 9513941     | 695122     | 9328488 |
| 8   | 3605395 | 10201534   | 9505288     | 696246     | 9327440 |
| 9   | 3608108 | 10194012   | 9496642     | 697370     | 9326391 |
| 10  | 3610821 | 10186496   | 9488001     | 698495     | 9325341 |
| 11  | 3613533 | 10178987   | 9479366     | 699621     | 9324290 |
| 12  | 3616245 | 10171484   | 9470736     | 700748     | 9323238 |
| 13  | 3618957 | 10163988   | 9462111     | 701877     | 9322186 |
| 14  | 3621669 | 10156498   | 9453491     | 703007     | 9321133 |
| 15  | 3624380 | 10149015   | 9444877     | 704138     | 9320079 |
| 16  | 3627091 | 10141538   | 9436268     | 705270     | 9319024 |
| 17  | 3629802 | 10134067   | 9427664     | 706403     | 9317969 |
| 18  | 3632512 | 10126603   | 9419066     | 707537     | 9316913 |
| 19  | 3635222 | 10119145   | 9410473     | 708672     | 9315856 |
| 20  | 3637932 | 10111694   | 9401886     | 709808     | 9314798 |
| 21  | 3640642 | 10104249   | 9393305     | 710944     | 9313739 |
| 22  | 3643351 | 10096811   | 9384730     | 712081     | 9312680 |
| 23  | 3646060 | 10089379   | 9376160     | 713219     | 9311620 |
| 24  | 3648768 | 10081953   | 9367595     | 714358     | 9310559 |
| 25  | 3651478 | 10074533   | 9359035     | 715498     | 9309497 |
| 26  | 3654184 | 10067120   | 9350481     | 716639     | 9308434 |
| 27  | 3656892 | 10059713   | 9341931     | 717782     | 9307371 |
| 28  | 3659599 | 10052312   | 9333386     | 718926     | 9306307 |
| 29  | 3662306 | 10044918   | 9324847     | 720071     | 9305242 |
| 30  | 3665012 | 10037530   | 9316313     | 721217     | 9304176 |

Gr.

21

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 3665012 | 10037530   | 9316313     | 721217     | 9304176 |
| 31  | 3667718 | 10030148   | 9307784     | 722364     | 9303109 |
| 32  | 3670424 | 10022773   | 9299261     | 723512     | 9302042 |
| 33  | 3673130 | 10015404   | 9290744     | 724660     | 9300974 |
| 34  | 3675835 | 10008041   | 9282232     | 725809     | 9299905 |
| 35  | 3678541 | 10000685   | 9273726     | 726959     | 9298836 |
| 36  | 3681246 | 9993335    | 9265215     | 728110     | 9297766 |
| 37  | 3683951 | 9985991    | 9256729     | 729262     | 9296695 |
| 38  | 3686655 | 9978653    | 9248238     | 730415     | 9295623 |
| 39  | 3689359 | 9971322    | 9239753     | 731569     | 9294550 |
| 40  | 3692062 | 9963997    | 9231273     | 732724     | 9293476 |
| 41  | 3694765 | 9956678    | 9222798     | 733880     | 9292401 |
| 42  | 3697468 | 9949366    | 9214326     | 735037     | 9291326 |
| 43  | 3700170 | 9942060    | 9205865     | 736195     | 9290250 |
| 44  | 3702872 | 9934760    | 9197406     | 737354     | 9289173 |
| 45  | 3705574 | 9927466    | 9188952     | 738514     | 9288096 |
| 46  | 3708276 | 9920178    | 9180503     | 739675     | 9287018 |
| 47  | 3710977 | 9912896    | 9172059     | 740837     | 9285939 |
| 48  | 3713678 | 9905620    | 9163620     | 742000     | 9284859 |
| 49  | 3716379 | 9898350    | 9155186     | 743164     | 9283778 |
| 50  | 3719080 | 9891086    | 9146757     | 744329     | 9282697 |
| 51  | 3721780 | 9883828    | 9138333     | 745495     | 9281615 |
| 52  | 3724480 | 9876577    | 9129915     | 746662     | 9280532 |
| 53  | 3727179 | 9869332    | 9121502     | 747830     | 9279448 |
| 54  | 3729878 | 9862093    | 9113094     | 748999     | 9278363 |
| 55  | 3732577 | 9854860    | 9104691     | 750169     | 9277278 |
| 56  | 3735275 | 9847633    | 9096293     | 751340     | 9276192 |
| 57  | 3737973 | 9840412    | 9087900     | 752512     | 9275105 |
| 58  | 3740671 | 9833192    | 9079512     | 753685     | 9274017 |
| 59  | 3743369 | 9825988    | 9071129     | 754859     | 9272928 |
| 60  | 3746066 | 9818785    | 9062752     | 756033     | 9271829 |



Gr.

22

22

mi.

Sinus

Logarithmi

Differentia

Logarithmi

Sinus

|    |         |         |         |        |         |    |
|----|---------|---------|---------|--------|---------|----|
| 0  | 3746066 | 9818785 | 9062752 | 756033 | 9271839 | 60 |
| 1  | 3748763 | 9811589 | 9054381 | 757208 | 9270749 | 59 |
| 2  | 3751460 | 9804392 | 9046015 | 758384 | 9269658 | 58 |
| 3  | 3754156 | 9797215 | 9037654 | 759561 | 9268566 | 57 |
| 4  | 3756852 | 9790036 | 9029296 | 760740 | 9267474 | 56 |
| 5  | 3759548 | 9782863 | 9020943 | 761920 | 9266381 | 55 |
| 6  | 3762243 | 9775696 | 9012595 | 763101 | 9265287 | 54 |
| 7  | 3764938 | 9768535 | 9004252 | 764283 | 9264192 | 53 |
| 8  | 3767633 | 9761380 | 8995914 | 765466 | 9263096 | 52 |
| 9  | 3770327 | 9754231 | 8987581 | 766650 | 9262000 | 51 |
| 10 | 3773021 | 9747088 | 8979253 | 767835 | 9260903 | 50 |
| 11 | 3775715 | 9739950 | 8970929 | 769021 | 9259805 | 49 |
| 12 | 3778408 | 9732818 | 8962610 | 770208 | 9258706 | 48 |
| 13 | 3781101 | 9725693 | 8954297 | 771396 | 9257606 | 47 |
| 14 | 3783794 | 9718574 | 8945989 | 772585 | 9256506 | 46 |
| 15 | 3786486 | 9711461 | 8937686 | 773775 | 9255405 | 45 |
| 16 | 3789178 | 9704354 | 8929388 | 774966 | 9254303 | 44 |
| 17 | 3791870 | 9697253 | 8921096 | 776157 | 9253200 | 43 |
| 18 | 3794562 | 9690158 | 8912809 | 777349 | 9252097 | 42 |
| 19 | 3797253 | 9683069 | 8904527 | 778542 | 9250993 | 41 |
| 20 | 3799944 | 9675986 | 8896259 | 779736 | 9249888 | 40 |
| 21 | 3802635 | 9668908 | 8887977 | 780931 | 9248782 | 39 |
| 22 | 3805325 | 9661836 | 8879709 | 782127 | 9247676 | 38 |
| 23 | 3808015 | 9654770 | 8871446 | 783324 | 9246569 | 37 |
| 24 | 3810704 | 9647709 | 8863187 | 784522 | 9245461 | 36 |
| 25 | 3813393 | 9640654 | 8854933 | 785721 | 9244352 | 35 |
| 26 | 3816082 | 9633605 | 8846683 | 786922 | 9243242 | 34 |
| 27 | 3818771 | 9626562 | 8838438 | 788124 | 9242131 | 33 |
| 28 | 3821459 | 9619525 | 8830198 | 789327 | 9241020 | 32 |
| 29 | 3824147 | 9612494 | 8821963 | 790531 | 9239908 | 31 |
| 30 | 3826834 | 9605468 | 8813732 | 791736 | 9238795 | 30 |

Gr.

22

22

mi.

Sinus

Logarithmi

Differentia

Logarithmi

Sinus

|    |         |         |         |        |         |    |
|----|---------|---------|---------|--------|---------|----|
| 30 | 3826834 | 9605468 | 8813732 | 791736 | 9238795 | 30 |
| 31 | 3829521 | 9598448 | 8805506 | 792942 | 9237682 | 29 |
| 32 | 3832208 | 9591434 | 8797285 | 794149 | 9236568 | 28 |
| 33 | 3834895 | 9584426 | 8789069 | 795357 | 9235453 | 27 |
| 34 | 3837581 | 9577424 | 8780859 | 796565 | 9234337 | 26 |
| 35 | 3840267 | 9570427 | 8772653 | 797774 | 9233220 | 25 |
| 36 | 3842953 | 9563436 | 8764452 | 798984 | 9232103 | 24 |
| 37 | 3845638 | 9556451 | 8756256 | 800195 | 9230985 | 23 |
| 38 | 3848323 | 9549472 | 8748065 | 801407 | 9229866 | 22 |
| 39 | 3851008 | 9542498 | 8739878 | 802620 | 9228746 | 21 |
| 40 | 3853692 | 9535530 | 8731696 | 803834 | 9227625 | 20 |
| 41 | 3856376 | 9528567 | 8723518 | 805049 | 9226504 | 19 |
| 42 | 3859060 | 9521610 | 8715345 | 806265 | 9225382 | 18 |
| 43 | 3861743 | 9514659 | 8707177 | 807482 | 9224259 | 17 |
| 44 | 3864426 | 9507713 | 8699013 | 808700 | 9223135 | 16 |
| 45 | 3867109 | 9500773 | 8690854 | 809919 | 9222010 | 15 |
| 46 | 3869791 | 9493839 | 8682700 | 811139 | 9220884 | 14 |
| 47 | 3872473 | 9486911 | 8674551 | 812360 | 9219758 | 13 |
| 48 | 3875155 | 9479988 | 8666405 | 813583 | 9218631 | 12 |
| 49 | 3877837 | 9473071 | 8658264 | 814807 | 9217504 | 11 |
| 50 | 3880518 | 9466160 | 8650128 | 816032 | 9216376 | 10 |
| 51 | 3883199 | 9459254 | 8641996 | 817258 | 9215247 | 9  |
| 52 | 3885880 | 9452354 | 8633870 | 818484 | 9214117 | 8  |
| 53 | 3888560 | 9445460 | 8625749 | 819711 | 9212986 | 7  |
| 54 | 3891240 | 9438571 | 8617632 | 820939 | 9211855 | 6  |
| 55 | 3893919 | 9431688 | 8609520 | 822168 | 9210723 | 5  |
| 56 | 3896598 | 9424810 | 8601412 | 823398 | 9209590 | 4  |
| 57 | 3899277 | 9417938 | 8593309 | 824629 | 9208455 | 3  |
| 58 | 3901955 | 9411071 | 8585210 | 825861 | 9207323 | 2  |
| 59 | 3904633 | 9404210 | 8577116 | 827094 | 9206185 | 1  |
| 60 | 3907311 | 9397354 | 8569026 | 828328 | 9205049 | 0  |

mi.

Gr.



Gr.

23

23

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus      |
|-----|---------|------------|-------------|------------|------------|
| 0   | 3907311 | 9397354    | 8569026     | 8283.8     | 9205049 60 |
| 1   | 3909989 | 9390504    | 8560941     | 829563     | 9203912 59 |
| 2   | 3912666 | 9383660    | 8552861     | 830799     | 9202774 58 |
| 3   | 3915343 | 9376821    | 8544785     | 832036     | 9201635 57 |
| 4   | 3918020 | 9369988    | 8536714     | 833274     | 9200496 56 |
| 5   | 3920696 | 9363160    | 8528647     | 834513     | 9199356 55 |
| 6   | 3923372 | 9356337    | 8520584     | 835753     | 9198215 54 |
| 7   | 3926048 | 9349520    | 8512525     | 836995     | 9197073 53 |
| 8   | 3928723 | 9342708    | 8504470     | 838238     | 9195931 52 |
| 9   | 3931398 | 9335902    | 8496420     | 839482     | 9194788 51 |
| 10  | 3934072 | 9329101    | 8488374     | 840727     | 9193644 50 |
| 11  | 3936746 | 9322306    | 8480333     | 841973     | 9192499 49 |
| 12  | 3939420 | 9315516    | 8472296     | 843220     | 9191353 48 |
| 13  | 3942093 | 9308731    | 8464263     | 844468     | 9190207 47 |
| 14  | 3944766 | 9301952    | 8456236     | 845716     | 9189060 46 |
| 15  | 3947439 | 9295178    | 8448213     | 846965     | 9187912 45 |
| 16  | 3950112 | 9288410    | 8440195     | 848215     | 9186763 44 |
| 17  | 3952784 | 9281647    | 8432181     | 849466     | 9185614 43 |
| 18  | 3955456 | 9274890    | 8424172     | 850718     | 9184464 42 |
| 19  | 3958128 | 9268138    | 8416167     | 851971     | 9183313 41 |
| 20  | 3960799 | 9261392    | 8408167     | 853225     | 9182161 40 |
| 21  | 3963470 | 9254651    | 8400171     | 854480     | 9181009 39 |
| 22  | 3966140 | 9247915    | 8392179     | 855736     | 9179856 38 |
| 23  | 3968810 | 9241185    | 8384192     | 856993     | 9178702 37 |
| 24  | 3971480 | 9234460    | 8376209     | 858251     | 9177547 36 |
| 25  | 3974149 | 9227741    | 8368231     | 859510     | 9176391 35 |
| 26  | 3976818 | 9221027    | 8360257     | 860770     | 9175235 34 |
| 27  | 3979487 | 9214319    | 8352288     | 862031     | 9174078 33 |
| 28  | 3982155 | 9207616    | 8344322     | 863294     | 9172920 32 |
| 29  | 3984823 | 9200918    | 8336360     | 864558     | 9171761 31 |
| 30  | 3987491 | 9194226    | 8328403     | 865823     | 9170601 30 |

Gr.

23

23

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus      |
|-----|---------|------------|-------------|------------|------------|
| 30  | 3987491 | 9194226    | 8328403     | 865823     | 9170601 30 |
| 31  | 3990159 | 9187539    | 8320450     | 867089     | 9169440 29 |
| 32  | 3992826 | 9180857    | 8312501     | 868356     | 9168279 28 |
| 33  | 3995493 | 9174181    | 8304558     | 869623     | 9167117 27 |
| 34  | 3998159 | 9167510    | 8296616     | 870891     | 9165955 26 |
| 35  | 4000825 | 9160844    | 8288684     | 872160     | 9164792 25 |
| 36  | 4003491 | 9154183    | 8280753     | 873430     | 9163628 24 |
| 37  | 4006156 | 9147528    | 8272827     | 874701     | 9162463 23 |
| 38  | 4008821 | 9140878    | 8264905     | 875973     | 9161297 22 |
| 39  | 4011486 | 9134233    | 8256987     | 877246     | 9160131 21 |
| 40  | 4014150 | 9127593    | 8249073     | 878520     | 9158964 20 |
| 41  | 4016814 | 9120959    | 8241164     | 879795     | 9157796 19 |
| 42  | 4019478 | 9114330    | 8233259     | 881071     | 9156627 18 |
| 43  | 4022141 | 9107706    | 8225358     | 882348     | 9155457 17 |
| 44  | 4024804 | 9101087    | 8217461     | 883626     | 9154286 16 |
| 45  | 4026467 | 9094473    | 8209568     | 884905     | 9153115 15 |
| 46  | 4028130 | 9087865    | 8201679     | 886186     | 9151943 14 |
| 47  | 4029792 | 9081262    | 8193794     | 887468     | 9150770 13 |
| 48  | 4031454 | 9074664    | 8185913     | 888751     | 9149597 12 |
| 49  | 4033115 | 9068071    | 8178036     | 890035     | 9148423 11 |
| 50  | 4034776 | 9061483    | 8170163     | 891320     | 9147248 10 |
| 51  | 4036437 | 9054901    | 8162295     | 892606     | 9146072 9  |
| 52  | 4038097 | 9048324    | 8154431     | 893893     | 9144895 8  |
| 53  | 4039757 | 9041752    | 8146571     | 895181     | 9143718 7  |
| 54  | 4041416 | 9035185    | 8138715     | 896470     | 9142540 6  |
| 55  | 4043075 | 9028623    | 8130863     | 897760     | 9141361 5  |
| 56  | 4044734 | 9022066    | 8123015     | 899051     | 9140181 4  |
| 57  | 4046392 | 9015514    | 8115172     | 900342     | 9139001 3  |
| 58  | 4048050 | 9008968    | 8107334     | 901634     | 9137820 2  |
| 59  | 4049708 | 9002427    | 8099500     | 902927     | 9136638 1  |
| 60  | 4051366 | 8995891    | 8091670     | 904221     | 9135455 0  |



Gr.

24

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 4067366 | 8995891    | 8091670     | 904221     | 9135455 |
| 1   | 4070023 | 8989360    | 8083844     | 905516     | 9134271 |
| 2   | 4072680 | 8982834    | 8076022     | 906812     | 9133087 |
| 3   | 4075337 | 8976313    | 8068204     | 908109     | 9131902 |
| 4   | 4077993 | 8969797    | 8060389     | 909408     | 9130716 |
| 5   | 4080649 | 8963286    | 8052578     | 910708     | 9129529 |
| 6   | 4083305 | 8956780    | 8044771     | 912009     | 9128342 |
| 7   | 4085960 | 8950280    | 8036969     | 913311     | 9127154 |
| 8   | 4088615 | 8943785    | 8029171     | 914614     | 9125965 |
| 9   | 4091269 | 8937295    | 8021377     | 915918     | 9124775 |
| 10  | 4093923 | 8930810    | 8013587     | 917223     | 9123584 |
| 11  | 4096577 | 8924330    | 8005801     | 918529     | 9122392 |
| 12  | 4099231 | 8917855    | 7998019     | 919836     | 9121200 |
| 13  | 4101884 | 8911385    | 7990241     | 921144     | 9120007 |
| 14  | 4104537 | 8904920    | 7982467     | 922453     | 9118814 |
| 15  | 4107189 | 8898460    | 7974697     | 923763     | 9117620 |
| 16  | 4109841 | 8892005    | 7966931     | 925074     | 9116425 |
| 17  | 4112493 | 8885555    | 7959169     | 926386     | 9115229 |
| 18  | 4115144 | 8879110    | 7951411     | 927699     | 9114032 |
| 19  | 4117795 | 8872670    | 7943657     | 929013     | 9112835 |
| 20  | 4120446 | 8866235    | 7935908     | 930327     | 9111637 |
| 21  | 4123096 | 8859804    | 7928161     | 931643     | 9110438 |
| 22  | 4125746 | 8853379    | 7920419     | 932960     | 9109238 |
| 23  | 4128395 | 8846959    | 7912681     | 934278     | 9108038 |
| 24  | 4131044 | 8840544    | 7904947     | 935597     | 9106837 |
| 25  | 4133693 | 8834134    | 7897217     | 936917     | 9105635 |
| 26  | 4136341 | 8827729    | 7889491     | 938238     | 9104432 |
| 27  | 4138989 | 8821329    | 7881769     | 939560     | 9103228 |
| 28  | 4141637 | 8814934    | 7874051     | 940883     | 9102024 |
| 29  | 4144285 | 8808544    | 7866337     | 942207     | 9100819 |
| 30  | 4146932 | 8802159    | 7858627     | 943532     | 9099613 |

65

Gr.

27

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 4146932 | 8802159    | 7858627     | 943532     | 9099613 |
| 31  | 4149579 | 8795779    | 7850921     | 944858     | 9098406 |
| 32  | 4152226 | 8789404    | 7843219     | 946185     | 9097198 |
| 33  | 4154872 | 8783033    | 7835520     | 947513     | 9095990 |
| 34  | 4157518 | 8776667    | 7827825     | 948842     | 9094781 |
| 35  | 4160163 | 8770306    | 7820134     | 950172     | 9093572 |
| 36  | 4162808 | 8763959    | 7812456     | 951503     | 9092362 |
| 37  | 4165453 | 8757599    | 7804764     | 952835     | 9091151 |
| 38  | 4168097 | 8751253    | 7797085     | 954168     | 9089939 |
| 39  | 4170741 | 8744912    | 7789409     | 955503     | 9088726 |
| 40  | 4173385 | 8738575    | 7781736     | 956839     | 9087512 |
| 41  | 4176028 | 8732243    | 7774067     | 958176     | 9086297 |
| 42  | 4178671 | 8725916    | 7766402     | 959514     | 9085082 |
| 43  | 4181313 | 8719594    | 7758741     | 960853     | 9083866 |
| 44  | 4183955 | 8713277    | 7751084     | 962193     | 9082649 |
| 45  | 4186597 | 8706965    | 7743431     | 963534     | 9081432 |
| 46  | 4189239 | 8700657    | 7735782     | 964875     | 9080214 |
| 47  | 4191880 | 8694354    | 7728137     | 966217     | 9078995 |
| 48  | 4194521 | 8688056    | 7720496     | 967560     | 9077775 |
| 49  | 4197162 | 8681763    | 7712859     | 968904     | 9076555 |
| 50  | 4199802 | 8675475    | 7705226     | 970249     | 9075334 |
| 51  | 4202442 | 8669192    | 7697597     | 971595     | 9074112 |
| 52  | 4205081 | 8662913    | 7689970     | 972943     | 9072889 |
| 53  | 4207720 | 8656639    | 7682347     | 974292     | 9071665 |
| 54  | 4210359 | 8650370    | 7674728     | 975642     | 9070441 |
| 55  | 4212997 | 8644106    | 7667113     | 976993     | 9069216 |
| 56  | 4215635 | 8637846    | 7659501     | 978345     | 9067990 |
| 57  | 4218273 | 8631591    | 7651893     | 979698     | 9066763 |
| 58  | 4220910 | 8625341    | 7644289     | 981052     | 9065535 |
| 59  | 4223547 | 8619096    | 7636689     | 982407     | 9064307 |
| 60  | 4226183 | 8612856    | 7629093     | 983763     | 9063078 |

G 2 65

65



Gr. 25

| 25<br>mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----------|---------|------------|-------------|------------|---------|
| 0         | 4226183 | 8612856    | 7629093     | 983763     | 9063078 |
| 1         | 4228819 | 8606620    | 7621500     | 985120     | 9061848 |
| 2         | 4231455 | 8600389    | 7613911     | 986478     | 9060618 |
| 3         | 4234090 | 8594163    | 7606326     | 987837     | 9059387 |
| 4         | 4236725 | 8587942    | 7598745     | 989197     | 9058155 |
| 5         | 4239360 | 8581725    | 7591167     | 990558     | 9056922 |
| 6         | 4241994 | 8575513    | 7583593     | 991920     | 9055688 |
| 7         | 4244628 | 8569306    | 7576023     | 993283     | 9054454 |
| 8         | 4247262 | 8563103    | 7568456     | 994647     | 9053219 |
| 9         | 4249895 | 855695     | 7560893     | 996012     | 9051983 |
| 10        | 4252528 | 8550712    | 7553333     | 997379     | 9050746 |
| 11        | 4255161 | 8544523    | 7545776     | 998747     | 9049508 |
| 12        | 4257793 | 8538339    | 7538223     | 1000116    | 9048270 |
| 13        | 4260425 | 8532160    | 7530674     | 1001486    | 9047031 |
| 14        | 4263056 | 8525985    | 7523129     | 1002856    | 9045791 |
| 15        | 4265687 | 8519815    | 7515588     | 1004227    | 9044551 |
| 16        | 4268318 | 8513650    | 7508051     | 1005599    | 9043310 |
| 17        | 4270949 | 8507489    | 7500517     | 1006972    | 9042068 |
| 18        | 4273579 | 8501333    | 7492987     | 1008346    | 9040825 |
| 19        | 4276209 | 8495181    | 7485460     | 1009721    | 9039582 |
| 20        | 4278838 | 8489034    | 7477937     | 1011097    | 9038338 |
| 21        | 4281467 | 8482892    | 7470418     | 1012474    | 9037093 |
| 22        | 4284096 | 8476754    | 7462902     | 1013852    | 9035847 |
| 23        | 4286724 | 8470621    | 7455389     | 1015232    | 9034600 |
| 24        | 4289352 | 8464493    | 7447880     | 1016613    | 9033353 |
| 25        | 4291979 | 8458369    | 7440374     | 1017995    | 9032105 |
| 26        | 4294606 | 8452250    | 7432872     | 1019378    | 9030856 |
| 27        | 4297233 | 8446135    | 7425373     | 1020762    | 9029606 |
| 28        | 4299859 | 8440025    | 7417878     | 1022147    | 9028356 |
| 29        | 4302485 | 8433919    | 7410386     | 1023533    | 9027105 |
| 30        | 4305111 | 8427818    | 7402898     | 1024920    | 9025853 |

Gr. 25

| 25<br>mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----------|---------|------------|-------------|------------|---------|
| 30        | 4305111 | 8427818    | 7402898     | 1024920    | 9025853 |
| 31        | 4307736 | 8421722    | 7395414     | 1026308    | 9024600 |
| 32        | 4310361 | 8415630    | 7387933     | 1027697    | 9023347 |
| 33        | 4312986 | 8409543    | 7380456     | 1029087    | 9022093 |
| 34        | 4315610 | 8403460    | 7372982     | 1030478    | 9020838 |
| 35        | 4318234 | 8397382    | 7365512     | 1031870    | 9019582 |
| 36        | 4320858 | 8391308    | 7358045     | 1033263    | 9018326 |
| 37        | 4323481 | 8385239    | 7350582     | 1034657    | 9017069 |
| 38        | 4326104 | 8379174    | 7343122     | 1036052    | 9015811 |
| 39        | 4328726 | 8373114    | 7335665     | 1037449    | 9014552 |
| 40        | 4331348 | 8367059    | 7328212     | 1038847    | 9013292 |
| 41        | 4333970 | 8361008    | 7320762     | 1040246    | 9012031 |
| 42        | 4336591 | 8354962    | 7313316     | 1041646    | 9010770 |
| 43        | 4339212 | 8348920    | 7305873     | 1043047    | 9009508 |
| 44        | 4341833 | 8342883    | 7298434     | 1044449    | 9008245 |
| 45        | 4344453 | 8336850    | 7290998     | 1045852    | 9006982 |
| 46        | 4347073 | 8330822    | 7283566     | 1047256    | 9005718 |
| 47        | 4349693 | 8324798    | 7276138     | 1048660    | 9004453 |
| 48        | 4352312 | 8318778    | 7268713     | 1050065    | 9003187 |
| 49        | 4354931 | 8312763    | 7261292     | 1051471    | 9001921 |
| 50        | 4357549 | 8306752    | 7253874     | 1052878    | 9000654 |
| 51        | 4360167 | 8300746    | 7246459     | 1054287    | 8999388 |
| 52        | 4362785 | 8294744    | 7239047     | 1055697    | 8998117 |
| 53        | 4365402 | 8288747    | 7231639     | 1057108    | 8996848 |
| 54        | 4368019 | 8282754    | 7224234     | 1058520    | 8995578 |
| 55        | 4370635 | 8276765    | 7216832     | 1059933    | 8994307 |
| 56        | 4373251 | 8270781    | 7209434     | 1061347    | 8993035 |
| 57        | 4375867 | 8264801    | 7202039     | 1062762    | 8991762 |
| 58        | 4378482 | 8258826    | 7194648     | 1064178    | 8990489 |
| 59        | 4381097 | 8252855    | 7187260     | 1065595    | 8989215 |
| 60        | 4383712 | 8246889    | 7179875     | 1067014    | 8987946 |



| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 4383712 | 8246889    | 7179875     | 1067014    | 8987940 |
| 1   | 4386326 | 8240927    | 7172493     | 1068434    | 8986664 |
| 2   | 4388940 | 8234970    | 7165115     | 1069855    | 8985388 |
| 3   | 4391554 | 8229017    | 7157740     | 1071277    | 8984111 |
| 4   | 4394167 | 8223068    | 7150368     | 1072700    | 8982833 |
| 5   | 4396780 | 8217124    | 7143001     | 1074123    | 8981555 |
| 6   | 4399392 | 8211184    | 7135637     | 1075547    | 8980276 |
| 7   | 4402004 | 8205249    | 7128277     | 1076972    | 8978996 |
| 8   | 4404616 | 8199318    | 7120920     | 1078398    | 8977715 |
| 9   | 4407227 | 8193391    | 7113566     | 1079825    | 8976433 |
| 10  | 4409838 | 8187469    | 7106216     | 1081253    | 8975151 |
| 11  | 4412442 | 8181551    | 7098868     | 1082683    | 8973868 |
| 12  | 4415052 | 8175638    | 7091524     | 1084114    | 8972584 |
| 13  | 4417669 | 8169729    | 7084183     | 1085546    | 8971299 |
| 14  | 4420278 | 8163824    | 7076845     | 1086979    | 8969913 |
| 15  | 4422887 | 8157923    | 7069510     | 1088413    | 8968527 |
| 16  | 4425496 | 8152027    | 7062179     | 1089848    | 8967140 |
| 17  | 4428104 | 8146135    | 7054851     | 1091284    | 8965752 |
| 18  | 4430712 | 8140247    | 7047526     | 1092721    | 8964364 |
| 19  | 4433320 | 8134364    | 7040205     | 1094159    | 8962975 |
| 20  | 4435927 | 8128485    | 7032887     | 1095598    | 8961585 |
| 21  | 4438534 | 8122610    | 7025572     | 1097038    | 8960194 |
| 22  | 4441140 | 8116739    | 7018260     | 1098479    | 8958802 |
| 23  | 4443746 | 8110873    | 7010952     | 1099921    | 8957410 |
| 24  | 4446352 | 8105011    | 7003647     | 1101364    | 8956017 |
| 25  | 4448957 | 8099153    | 6996345     | 1102808    | 8954624 |
| 26  | 4451562 | 8093299    | 6989045     | 1104254    | 8953230 |
| 27  | 4454167 | 8087450    | 6981749     | 1105691    | 8951835 |
| 28  | 4456771 | 8081605    | 6974456     | 1107149    | 8950440 |
| 29  | 4459375 | 8075764    | 6967166     | 1108598    | 8949044 |
| 30  | 4461978 | 8069927    | 6959879     | 1110048    | 8947648 |

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 4461978 | 8069927    | 6959879     | 1110048    | 8947648 |
| 31  | 4464581 | 8064095    | 6952596     | 1111499    | 8946251 |
| 32  | 4467184 | 8058267    | 6945316     | 1112951    | 8944854 |
| 33  | 4469786 | 8052443    | 6938039     | 1114404    | 8943456 |
| 34  | 4472388 | 8046623    | 6930765     | 1115858    | 8942058 |
| 35  | 4474990 | 8040808    | 6923495     | 1117313    | 8940659 |
| 36  | 4477591 | 8034997    | 6916228     | 1118769    | 8939260 |
| 37  | 4480192 | 8029190    | 6908964     | 1120226    | 8937861 |
| 38  | 4482792 | 8023387    | 6901703     | 1121684    | 8936462 |
| 39  | 4485392 | 8017589    | 6894446     | 1123143    | 8935063 |
| 40  | 4487992 | 8011795    | 6887191     | 1124604    | 8933664 |
| 41  | 4490591 | 8006005    | 6879939     | 1126066    | 8932265 |
| 42  | 4493190 | 8000219    | 6872690     | 1127529    | 8930866 |
| 43  | 4495788 | 7994437    | 6865444     | 1128993    | 8929467 |
| 44  | 4498386 | 7988660    | 6858202     | 1130458    | 8928068 |
| 45  | 4500984 | 7982887    | 6850963     | 1131924    | 8926669 |
| 46  | 4503582 | 7977118    | 6843727     | 1133391    | 8925270 |
| 47  | 4506179 | 7971353    | 6836494     | 1134859    | 8923871 |
| 48  | 4508776 | 7965592    | 6829265     | 1136327    | 8922472 |
| 49  | 4511372 | 7959835    | 6822039     | 1137796    | 8921073 |
| 50  | 4514968 | 7954083    | 6814817     | 1139266    | 8919674 |
| 51  | 4516563 | 7948335    | 6807597     | 1140738    | 8918275 |
| 52  | 4519158 | 7942591    | 6800380     | 1142211    | 8916876 |
| 53  | 4521753 | 7936851    | 6793166     | 1143685    | 8915477 |
| 54  | 4524347 | 7931115    | 6785955     | 1145160    | 8914078 |
| 55  | 4526941 | 7925383    | 6778747     | 1146636    | 8912679 |
| 56  | 4529535 | 7919655    | 6771542     | 1148113    | 8911280 |
| 57  | 4532128 | 7913932    | 6764340     | 1149592    | 8909881 |
| 58  | 4534721 | 7908213    | 6757141     | 1151072    | 8908482 |
| 59  | 4537313 | 7902498    | 6749945     | 1152553    | 8907083 |
| 60  | 4539905 | 7896787    | 6742752     | 1154035    | 8905684 |



Gr. 27

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 4539905 | 7896787    | 6742752     | 1154035    | 8910065 |
| 1   | 4542497 | 7891080    | 6735562     | 1155518    | 8908744 |
| 2   | 4545088 | 7885377    | 6728375     | 1157002    | 8907412 |
| 3   | 4547679 | 7879678    | 6721191     | 1158487    | 8906099 |
| 4   | 4540270 | 7873983    | 6714010     | 1159973    | 8904776 |
| 5   | 4552860 | 7868292    | 6706832     | 1161460    | 8903452 |
| 6   | 4555450 | 7862605    | 6699657     | 1162948    | 8902127 |
| 7   | 4558639 | 7856923    | 6692486     | 1164437    | 8900802 |
| 8   | 4560628 | 7851245    | 6685318     | 1165927    | 8899476 |
| 9   | 4563216 | 7845571    | 6678153     | 1167418    | 8898149 |
| 10  | 4565804 | 7839901    | 6670991     | 1168910    | 8896821 |
| 11  | 4568392 | 7834235    | 6663832     | 1170403    | 8895492 |
| 12  | 4570979 | 7828573    | 6656676     | 1171897    | 8894163 |
| 13  | 4573566 | 7822915    | 6649523     | 1173392    | 8892833 |
| 14  | 4576153 | 7817261    | 6642373     | 1174888    | 8891501 |
| 15  | 4578739 | 7811611    | 6635225     | 1176386    | 8890171 |
| 16  | 4581325 | 7805965    | 6628080     | 1177885    | 8888839 |
| 17  | 4584911 | 7800323    | 6620938     | 1179385    | 8887506 |
| 18  | 4586496 | 7794685    | 6613799     | 1180886    | 8886172 |
| 19  | 4589081 | 7789051    | 6606663     | 1182388    | 8884838 |
| 20  | 4591665 | 7783422    | 6599531     | 1183891    | 8883503 |
| 21  | 4594249 | 7777797    | 6592402     | 1185395    | 8882167 |
| 22  | 4596833 | 7772176    | 6585276     | 1186900    | 8880830 |
| 23  | 4599416 | 7766558    | 6578152     | 1188406    | 8879492 |
| 24  | 4601999 | 7760944    | 6571031     | 1189913    | 8878154 |
| 25  | 4604581 | 7755334    | 6563913     | 1191421    | 8876815 |
| 26  | 4607163 | 7749728    | 6556797     | 1192931    | 8875485 |
| 27  | 4609744 | 7744126    | 6549684     | 1194442    | 8874134 |
| 28  | 4612325 | 7738528    | 6542574     | 1195954    | 8872793 |
| 29  | 4614906 | 7732934    | 6535467     | 1197467    | 8871451 |
| 30  | 4617486 | 7727344    | 6528363     | 1198981    | 8870108 |

Gr. 27

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 4617486 | 7727344    | 6528363     | 1198981    | 8870108 |
| 31  | 4620066 | 7721757    | 6521261     | 1200496    | 8868765 |
| 32  | 4622646 | 7716174    | 6514162     | 1202012    | 8867421 |
| 33  | 4625225 | 7710596    | 6507067     | 1203529    | 8866076 |
| 34  | 4627804 | 7705022    | 6499975     | 1205047    | 8864730 |
| 35  | 4630382 | 7699452    | 6492886     | 1206566    | 8863383 |
| 36  | 4632960 | 7693886    | 6485800     | 1208086    | 8862035 |
| 37  | 4635538 | 7688324    | 6478717     | 1209607    | 8860687 |
| 38  | 4638115 | 7682766    | 6471637     | 1211129    | 8859338 |
| 39  | 4640692 | 7677212    | 6464560     | 1212652    | 8857989 |
| 40  | 4643268 | 7671662    | 6457485     | 1214177    | 8856639 |
| 41  | 4645844 | 7666116    | 6450413     | 1215703    | 8855288 |
| 42  | 4648420 | 7660574    | 6443344     | 1217230    | 8853936 |
| 43  | 4650995 | 7655035    | 6436277     | 1218758    | 8852583 |
| 44  | 4653570 | 7649500    | 6429213     | 1220287    | 8851230 |
| 45  | 4656145 | 7643969    | 6422152     | 1221817    | 8849876 |
| 46  | 4658719 | 7638442    | 6415094     | 1223348    | 8848521 |
| 47  | 4661293 | 7632919    | 6408039     | 1224880    | 8847165 |
| 48  | 4663866 | 7627400    | 6400987     | 1226413    | 8845809 |
| 49  | 4666439 | 7621885    | 6393938     | 1227947    | 8844452 |
| 50  | 4669012 | 7616374    | 6386893     | 1229481    | 8843095 |
| 51  | 4671584 | 7610867    | 6379850     | 1231017    | 8841737 |
| 52  | 4674156 | 7605363    | 6372809     | 1232554    | 8840378 |
| 53  | 4676727 | 7599863    | 6365771     | 1234092    | 8839018 |
| 54  | 4679298 | 7594367    | 6358735     | 1235632    | 8837657 |
| 55  | 4681869 | 7588875    | 6351702     | 1237173    | 8836295 |
| 56  | 4684439 | 7583387    | 6344672     | 1238715    | 8834932 |
| 57  | 4687009 | 7577903    | 6337645     | 1240258    | 8833569 |
| 58  | 4689578 | 7572422    | 6330620     | 1241802    | 8832205 |
| 59  | 4692147 | 7566945    | 6323598     | 1243347    | 8830841 |
| 60  | 4694716 | 7561472    | 6316578     | 1244894    | 8829476 |



| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 4694716 | 7561472    | 6316578     | 1244894    | 8829476 |
| 1   | 4697284 | 7556003    | 6309561     | 1246442    | 8828110 |
| 2   | 4699852 | 7550538    | 6302547     | 1247991    | 8826743 |
| 3   | 4702419 | 7645076    | 6295535     | 1249541    | 8825375 |
| 4   | 4804986 | 7539618    | 6288526     | 1251092    | 8824007 |
| 5   | 4707553 | 7534164    | 6281520     | 1252644    | 8822638 |
| 6   | 4710119 | 7528714    | 6274517     | 1254197    | 8821268 |
| 7   | 4712685 | 7523268    | 6267517     | 1255751    | 8819898 |
| 8   | 4715250 | 7517826    | 6260521     | 1257305    | 8818527 |
| 9   | 4717815 | 7512388    | 6253528     | 1258860    | 8817155 |
| 10  | 4720380 | 7506954    | 6246528     | 1260416    | 8815783 |
| 11  | 4722944 | 7501524    | 6239550     | 1261974    | 8814408 |
| 12  | 4725508 | 7496097    | 6232564     | 1263533    | 8813034 |
| 13  | 4728071 | 7490674    | 6225581     | 1265093    | 8811659 |
| 14  | 4730634 | 7485255    | 6218601     | 1266654    | 8810285 |
| 15  | 4733197 | 7479840    | 6211624     | 1268216    | 8808907 |
| 16  | 4735759 | 7474428    | 6204649     | 1269779    | 8807530 |
| 17  | 4738321 | 7469020    | 6197676     | 1271344    | 8806152 |
| 18  | 4740882 | 7463616    | 6190706     | 1272910    | 8804773 |
| 19  | 4743443 | 7458216    | 6183739     | 1274477    | 8803394 |
| 20  | 4746004 | 7452819    | 6176774     | 1276045    | 8802014 |
| 21  | 4748564 | 7447426    | 6169812     | 1277614    | 8800633 |
| 22  | 4751124 | 7442037    | 6162853     | 1279184    | 8799251 |
| 23  | 4753683 | 7436651    | 6155896     | 1280755    | 8797869 |
| 24  | 4756242 | 7431269    | 6148942     | 1282327    | 8796486 |
| 25  | 4758801 | 7425891    | 6141991     | 1283900    | 8795102 |
| 26  | 4761359 | 7420517    | 6135063     | 1285474    | 8793717 |
| 27  | 4763917 | 7415146    | 6128096     | 1287050    | 8792332 |
| 28  | 4766474 | 7409779    | 6121152     | 1288627    | 8790946 |
| 29  | 4769031 | 7404416    | 6114211     | 1290205    | 8789559 |
| 30  | 4771588 | 7399057    | 6107273     | 1291784    | 8788171 |

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 4771588 | 7399057    | 6107273     | 1291784    | 8788171 |
| 31  | 4774144 | 7393701    | 6100337     | 1293364    | 8786782 |
| 32  | 4776700 | 7388349    | 6093404     | 1294945    | 8785393 |
| 33  | 4779255 | 7483001    | 6086474     | 1296527    | 8784003 |
| 34  | 4781810 | 7377657    | 6079547     | 1298110    | 8782613 |
| 35  | 4784365 | 7372316    | 6072622     | 1299694    | 8781222 |
| 36  | 4786919 | 7366979    | 6065700     | 1301279    | 8779830 |
| 37  | 4789473 | 7361646    | 6058781     | 1302865    | 8778437 |
| 38  | 4792026 | 7356316    | 6051863     | 1304453    | 8777044 |
| 39  | 4794579 | 7350990    | 6044948     | 1306042    | 8775650 |
| 40  | 4797132 | 7345668    | 6038036     | 1307632    | 8774255 |
| 41  | 4799684 | 7340349    | 6031126     | 1309223    | 8772859 |
| 42  | 4802236 | 7335034    | 6024219     | 1310815    | 8771462 |
| 43  | 4804787 | 7329723    | 6017315     | 1312408    | 8770065 |
| 44  | 4807338 | 7324415    | 6010413     | 1314002    | 8768667 |
| 45  | 4809888 | 7319111    | 6003514     | 1315597    | 8767267 |
| 46  | 4812438 | 7313811    | 5996618     | 1317193    | 8765868 |
| 47  | 4814988 | 7308514    | 5989723     | 1318791    | 8764468 |
| 48  | 4817537 | 7303221    | 5982831     | 1320390    | 8763068 |
| 49  | 4820086 | 7297931    | 5975941     | 1321990    | 8761665 |
| 50  | 4822633 | 7292645    | 5969054     | 1323591    | 8760263 |
| 51  | 4825183 | 7287363    | 5962170     | 1325193    | 8758860 |
| 52  | 4827731 | 7282084    | 5955288     | 1326796    | 8757456 |
| 53  | 4830278 | 7276809    | 5948409     | 1328400    | 8756051 |
| 54  | 4832825 | 7271538    | 5941533     | 1330005    | 8754646 |
| 55  | 4835371 | 7266270    | 5934659     | 1331611    | 8753240 |
| 56  | 4837917 | 7261006    | 5927787     | 1333219    | 8751833 |
| 57  | 4840462 | 7255746    | 5920918     | 1334828    | 8750425 |
| 58  | 4843007 | 7250489    | 5914051     | 1336438    | 8749016 |
| 59  | 4845552 | 7245236    | 5907187     | 1338049    | 8747607 |
| 60  | 4848096 | 7239987    | 5900326     | 1339661    | 8746197 |



Gr.

29

29

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 4848096 | 7239987    | 5900326     | 1339661    | 8746197 |
| 1   | 4850640 | 7234712    | 5893468     | 1341274    | 8744787 |
| 2   | 4853184 | 7229500    | 5886612     | 1342888    | 8743376 |
| 3   | 4855727 | 7224262    | 5879759     | 1344503    | 8741964 |
| 4   | 4858270 | 7219027    | 5872906     | 1346119    | 8740551 |
| 5   | 4860812 | 7213795    | 5866059     | 1347736    | 8739137 |
| 6   | 4863354 | 7208567    | 5859213     | 1349354    | 8737722 |
| 7   | 4865895 | 7203342    | 5852368     | 1350974    | 8736307 |
| 8   | 4868436 | 7198121    | 5845526     | 1352595    | 8734891 |
| 9   | 4870977 | 7192903    | 5838686     | 1354217    | 8733475 |
| 10  | 4873517 | 7187689    | 5831849     | 1355840    | 8732058 |
| 11  | 4876057 | 7182478    | 5825014     | 1357464    | 8730640 |
| 12  | 4878596 | 7177271    | 5818182     | 1359089    | 8729221 |
| 13  | 4881135 | 7172068    | 5811353     | 1360715    | 8727801 |
| 14  | 4883674 | 7166868    | 5804526     | 1362342    | 8726381 |
| 15  | 4886212 | 7161672    | 5797701     | 1363971    | 8724960 |
| 16  | 4888750 | 7156480    | 5790879     | 1365601    | 8723538 |
| 17  | 4891287 | 7151291    | 5784059     | 1367232    | 8722116 |
| 18  | 4893824 | 7146106    | 5777242     | 1368864    | 8720693 |
| 19  | 4896361 | 7140924    | 5770427     | 1370497    | 8719269 |
| 20  | 4898897 | 7135746    | 5763615     | 1372131    | 8717844 |
| 21  | 4901433 | 7130572    | 5756806     | 1373766    | 8716418 |
| 22  | 4903968 | 7125401    | 5749999     | 1375402    | 8714992 |
| 23  | 4906503 | 7120234    | 5743195     | 1377039    | 8713565 |
| 24  | 4909037 | 7115070    | 5736392     | 1378678    | 8712138 |
| 25  | 4911571 | 7109909    | 5729591     | 1380318    | 8710710 |
| 26  | 4914105 | 7104752    | 5722793     | 1381959    | 8709281 |
| 27  | 4916638 | 7099598    | 5715997     | 1383601    | 8707851 |
| 28  | 4919171 | 7094448    | 5709204     | 1385244    | 8706420 |
| 29  | 4921703 | 7089301    | 5702413     | 1386888    | 8704989 |
| 30  | 4924235 | 7084158    | 5695625     | 1388533    | 8703557 |

60

Gr.

29

29

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 4924235 | 7084158    | 5695625     | 1388533    | 8703557 |
| 31  | 4926767 | 7079018    | 5688839     | 1390179    | 8702124 |
| 32  | 4929298 | 7073882    | 5682056     | 1391826    | 8700691 |
| 33  | 4931829 | 7068749    | 5675275     | 1393474    | 8699257 |
| 34  | 4934359 | 7063620    | 5668496     | 1395123    | 8697822 |
| 35  | 4936889 | 7058494    | 5661719     | 1396775    | 8696386 |
| 36  | 4939418 | 7053372    | 5654945     | 1398427    | 8694949 |
| 37  | 4941947 | 7048253    | 5648173     | 1400080    | 8693512 |
| 38  | 4944476 | 7043138    | 5641404     | 1401734    | 8692074 |
| 39  | 4947004 | 7038026    | 5634637     | 1403389    | 8690636 |
| 40  | 4949532 | 7032918    | 5627873     | 1405045    | 8689197 |
| 41  | 4952059 | 7027814    | 5621111     | 1406703    | 8687757 |
| 42  | 4954586 | 7022713    | 5614351     | 1408362    | 8686316 |
| 43  | 4957113 | 7017615    | 5607593     | 1410022    | 8684873 |
| 44  | 4959639 | 7012521    | 5600838     | 1411683    | 8683431 |
| 45  | 4962165 | 7007430    | 5594085     | 1413345    | 8681988 |
| 46  | 4964690 | 7002342    | 5587334     | 1415008    | 8680544 |
| 47  | 4967215 | 6997258    | 5580586     | 1416672    | 8679100 |
| 48  | 4969740 | 6992177    | 5573840     | 1418337    | 8677655 |
| 49  | 4972264 | 6987099    | 5567095     | 1420004    | 8676209 |
| 50  | 4974788 | 6982025    | 5560353     | 1421672    | 8674762 |
| 51  | 4977311 | 6976954    | 5553613     | 1423341    | 8673314 |
| 52  | 4979834 | 6971886    | 5546875     | 1425011    | 8671866 |
| 53  | 4982356 | 6966821    | 5540140     | 1426682    | 8670417 |
| 54  | 4984878 | 6961761    | 5533407     | 1428354    | 8668968 |
| 55  | 4987399 | 6956704    | 5526677     | 1430027    | 8667518 |
| 56  | 4989920 | 6951650    | 5519949     | 1431701    | 8666067 |
| 57  | 4992441 | 6946600    | 5513224     | 1433376    | 8664615 |
| 58  | 4994961 | 6941553    | 5506500     | 1435053    | 8663162 |
| 59  | 4997481 | 6936509    | 5499778     | 1436731    | 8661708 |
| 60  | 5000000 | 6931469    | 5493059     | 1438410    | 8660254 |

H 3 60

mi.

Gr.

60



Gr. 30

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 5000000 | 6931469    | 5493059     | 1438410    | 8660254 |
| 1   | 5002519 | 6926432    | 5486342     | 1440090    | 8658799 |
| 2   | 5005038 | 6921399    | 5479628     | 1441771    | 8657344 |
| 3   | 5007556 | 6916369    | 5472916     | 1443453    | 8655888 |
| 4   | 5010074 | 6911342    | 5466206     | 1445136    | 8654431 |
| 5   | 5012591 | 6906319    | 5459498     | 1446821    | 8652973 |
| 6   | 5015108 | 6901299    | 5452792     | 1448507    | 8651514 |
| 7   | 5017624 | 6896282    | 5446088     | 1450194    | 8650055 |
| 8   | 5020140 | 6891269    | 5439387     | 1451882    | 8648595 |
| 9   | 5022656 | 6886259    | 5432688     | 1453571    | 8647134 |
| 10  | 5025171 | 6881253    | 5425992     | 1455261    | 8645673 |
| 11  | 5027686 | 6876250    | 5419298     | 1456952    | 8644211 |
| 12  | 5030200 | 6871250    | 5412605     | 1258645    | 8642748 |
| 13  | 5032714 | 6866254    | 5405915     | 1460339    | 3641284 |
| 14  | 5035227 | 6861261    | 5399227     | 1462034    | 8639820 |
| 15  | 5037740 | 6856271    | 5392541     | 1463730    | 8638355 |
| 16  | 5040253 | 6851285    | 5385858     | 1465427    | 8636889 |
| 17  | 5042765 | 6846302    | 5379177     | 1467125    | 8635423 |
| 18  | 5045277 | 6841323    | 5372499     | 1468824    | 8633956 |
| 19  | 5047788 | 6836347    | 5365822     | 1470525    | 8632488 |
| 20  | 5050299 | 6831374    | 5359147     | 1472227    | 8631019 |
| 21  | 5052809 | 6826405    | 5352475     | 1473930    | 8629549 |
| 22  | 5055319 | 6821439    | 5345805     | 1475634    | 8628079 |
| 23  | 5057829 | 6816476    | 5339137     | 1477339    | 8626608 |
| 24  | 5060338 | 6811516    | 5332471     | 1479045    | 8625137 |
| 25  | 5062847 | 6806560    | 5325808     | 1480752    | 8623665 |
| 26  | 5065355 | 6801607    | 5319147     | 1482460    | 8622192 |
| 27  | 5067863 | 6796657    | 5312488     | 1484169    | 8620718 |
| 28  | 5070370 | 6791710    | 5305831     | 1485879    | 8619243 |
| 29  | 5072877 | 6786767    | 5299177     | 1487590    | 8617768 |
| 30  | 5075384 | 6781827    | 5292525     | 1489302    | 8616292 |

Gr. 30

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 5075384 | 6781827    | 5292525     | 1489302    | 8616292 |
| 31  | 5077890 | 6776890    | 5285874     | 1491016    | 8614815 |
| 32  | 5080396 | 6771956    | 5279225     | 1492731    | 8613338 |
| 33  | 5082901 | 6767026    | 5272579     | 1494447    | 8611860 |
| 34  | 5085406 | 6762099    | 5265934     | 1496165    | 8610381 |
| 35  | 5087911 | 6757175    | 5259291     | 1497884    | 8608901 |
| 36  | 5090415 | 6752255    | 5252651     | 1499604    | 8607420 |
| 37  | 5092919 | 6747338    | 5246013     | 1501325    | 8605939 |
| 38  | 5095422 | 6742424    | 5239377     | 1503047    | 8604457 |
| 39  | 5097925 | 6737513    | 5232743     | 1504770    | 8602975 |
| 40  | 5100427 | 6732606    | 5226112     | 1506494    | 8601492 |
| 41  | 5102929 | 6727702    | 5219482     | 1508220    | 8600008 |
| 42  | 5105430 | 6722802    | 5212855     | 1509947    | 8598523 |
| 43  | 5107932 | 6717905    | 5206230     | 1511675    | 8597037 |
| 44  | 5110431 | 6713011    | 5199607     | 1513404    | 8595551 |
| 45  | 5112931 | 6708120    | 5192986     | 1515134    | 8594064 |
| 46  | 5115431 | 6703232    | 5186367     | 1516865    | 8592577 |
| 47  | 5117930 | 6698348    | 5179751     | 1518597    | 8591089 |
| 48  | 5120429 | 6693467    | 5173137     | 1520330    | 8589600 |
| 49  | 5122927 | 6688589    | 5166525     | 1522064    | 8588110 |
| 50  | 5125425 | 6683714    | 5159914     | 1523800    | 8586619 |
| 51  | 5127922 | 6678842    | 5153305     | 1525537    | 8585127 |
| 52  | 5130419 | 6673974    | 5146699     | 1527275    | 8583635 |
| 53  | 5132916 | 6669109    | 5140095     | 1529014    | 8582142 |
| 54  | 5135412 | 6664247    | 5133493     | 1530754    | 8580649 |
| 55  | 5137908 | 6659388    | 5126892     | 1532496    | 8579155 |
| 56  | 5140403 | 6654532    | 5120293     | 1534239    | 8577660 |
| 57  | 5142898 | 6649680    | 5113697     | 1535983    | 8576164 |
| 58  | 5145393 | 6644831    | 5107103     | 1537728    | 8574668 |
| 59  | 5147887 | 6639985    | 5100511     | 1539474    | 8573171 |
| 60  | 5150381 | 6635142    | 5093921     | 1541221    | 8571673 |



Gr.

31

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 5150381 | 6635142    | 5093921     | 1541221    | 8571673 |
| 1   | 5152874 | 6630302    | 5087332     | 1542970    | 8570175 |
| 2   | 5155367 | 6625465    | 5080745     | 1544720    | 8568676 |
| 3   | 5157859 | 6620631    | 5074160     | 1546471    | 8567176 |
| 4   | 5160351 | 6615801    | 5067578     | 1548223    | 8565675 |
| 5   | 5162843 | 6610974    | 5060998     | 1549976    | 8564173 |
| 6   | 5165334 | 6606150    | 5054420     | 1551730    | 8562671 |
| 7   | 5167825 | 6601329    | 5047844     | 1553485    | 8561168 |
| 8   | 5170315 | 6596512    | 5041271     | 1555241    | 8559664 |
| 9   | 5172805 | 6591698    | 5034700     | 1556998    | 8558160 |
| 10  | 5175294 | 6586887    | 5028130     | 1558757    | 8556655 |
| 11  | 5177783 | 6582079    | 5021562     | 1560517    | 8555149 |
| 12  | 5180271 | 6577275    | 5014997     | 1562278    | 8553643 |
| 13  | 5182759 | 6572474    | 5008434     | 1564040    | 8552136 |
| 14  | 5185246 | 6567676    | 5001873     | 1565803    | 8550628 |
| 15  | 5187733 | 6562881    | 4995313     | 1567568    | 8549119 |
| 16  | 5190220 | 6558089    | 4988755     | 1569334    | 8547609 |
| 17  | 5192706 | 6553300    | 4982199     | 1571101    | 8546096 |
| 18  | 5195192 | 6548514    | 4975645     | 1572869    | 8544588 |
| 19  | 5197677 | 6543731    | 4969093     | 1574638    | 8543077 |
| 20  | 5200162 | 6538951    | 4962543     | 1576408    | 8541565 |
| 21  | 5202646 | 6534174    | 4955994     | 1578180    | 8540052 |
| 22  | 5205130 | 6529400    | 4949447     | 1579953    | 8538538 |
| 23  | 5207614 | 6524629    | 4942902     | 1581727    | 8537024 |
| 24  | 5210097 | 6519862    | 4936360     | 1583502    | 8535509 |
| 25  | 5212580 | 6515098    | 4929820     | 1585278    | 8533993 |
| 26  | 5215062 | 6510337    | 4923282     | 1587055    | 8532476 |
| 27  | 5217544 | 6505580    | 4916747     | 1588833    | 8530958 |
| 28  | 5220025 | 6500826    | 4910213     | 1590613    | 8529440 |
| 29  | 5222506 | 6496075    | 4903681     | 1592394    | 8527921 |
| 30  | 5224986 | 6491327    | 4897151     | 1594176    | 8526402 |

58

Gr.

1

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 5224986 | 6491327    | 4897151     | 1594176    | 8526402 |
| 31  | 5227466 | 6486583    | 4890624     | 1595959    | 8524882 |
| 32  | 5229946 | 6481842    | 4884098     | 1597744    | 8523361 |
| 33  | 5232425 | 6477103    | 4877573     | 1599530    | 8521839 |
| 34  | 5234904 | 6472367    | 4871050     | 1601317    | 8520317 |
| 35  | 5237382 | 6467634    | 4864529     | 1603105    | 8518794 |
| 36  | 5239800 | 6462904    | 4858010     | 1604894    | 8517270 |
| 37  | 5242337 | 6458177    | 4851493     | 1606684    | 8515745 |
| 38  | 5244814 | 6453453    | 4844978     | 1608475    | 8514220 |
| 39  | 5247290 | 6448732    | 4838465     | 1610267    | 8512694 |
| 40  | 5249766 | 6444014    | 4831954     | 1612060    | 8511167 |
| 41  | 5252241 | 6439299    | 4825444     | 1613855    | 8509639 |
| 42  | 5254716 | 6434588    | 4818937     | 1615651    | 8508111 |
| 43  | 5257191 | 6429880    | 4812432     | 1617448    | 8506582 |
| 44  | 5259665 | 6425175    | 4805929     | 1619246    | 8505052 |
| 45  | 5262139 | 6420473    | 4799427     | 1621046    | 8503522 |
| 46  | 5264612 | 6415774    | 4792927     | 1622847    | 8501991 |
| 47  | 5267085 | 6411078    | 4786429     | 1624649    | 8500459 |
| 48  | 5269557 | 6406385    | 4779933     | 1626452    | 8498927 |
| 49  | 5272029 | 6401695    | 4773439     | 1628256    | 8497394 |
| 50  | 5274501 | 6397008    | 4766947     | 1630061    | 8495860 |
| 51  | 5276972 | 6392324    | 4760456     | 1631868    | 8494326 |
| 52  | 5279443 | 6387643    | 4753967     | 1633676    | 8492791 |
| 53  | 5281913 | 6382965    | 4747480     | 1635485    | 8491255 |
| 54  | 5284383 | 6378290    | 4740995     | 1637295    | 8489718 |
| 55  | 5286852 | 6373618    | 4734512     | 1639106    | 8488180 |
| 56  | 5289321 | 6368949    | 4728031     | 1640918    | 8486641 |
| 57  | 5291789 | 6364283    | 4721552     | 1642731    | 8485102 |
| 58  | 5294257 | 6359620    | 4715074     | 1644546    | 8483562 |
| 59  | 5296725 | 6354951    | 4708599     | 1646362    | 8482022 |
| 60  | 5299192 | 6350305    | 4702126     | 1648179    | 8480481 |

58

mi.  
Gr.  
58



Gr. 32

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus      |
|-----|---------|------------|-------------|------------|------------|
| 0   | 5299192 | 6350305    | 4702126     | 1648179    | 8480481 60 |
| 1   | 5301659 | 6345652    | 4695655     | 1649997    | 8478939 59 |
| 2   | 5304125 | 6341002    | 4689186     | 1651816    | 8477297 58 |
| 3   | 5306591 | 6336354    | 4682717     | 1653637    | 8475854 57 |
| 4   | 5309056 | 6331709    | 4676240     | 1655459    | 8474310 56 |
| 5   | 5311521 | 6327067    | 4669785     | 1657282    | 8472765 55 |
| 6   | 5313985 | 6322428    | 4663322     | 1659106    | 8471219 54 |
| 7   | 5316449 | 6317792    | 4656861     | 1660931    | 8469673 53 |
| 8   | 5318913 | 6313159    | 4650402     | 1662757    | 8468126 52 |
| 9   | 5321376 | 6308529    | 4643944     | 1664585    | 8466579 51 |
| 10  | 5323839 | 6303902    | 4637488     | 1666414    | 8465031 50 |
| 11  | 5326301 | 6299278    | 4631034     | 1668244    | 8463482 49 |
| 12  | 5328763 | 6294657    | 4624582     | 1670075    | 8461932 48 |
| 13  | 5331224 | 6290039    | 4618131     | 1671908    | 8460381 47 |
| 14  | 5333685 | 6285424    | 4611682     | 1673742    | 8458830 46 |
| 15  | 5336145 | 6280812    | 4605235     | 1675577    | 8457278 45 |
| 16  | 5338605 | 6276203    | 4598790     | 1677413    | 8455725 44 |
| 17  | 5341066 | 6271597    | 4592347     | 1679250    | 8454172 43 |
| 18  | 5343524 | 6266994    | 4585906     | 1681088    | 8452618 42 |
| 19  | 5345983 | 6262394    | 4579467     | 1682927    | 8451064 41 |
| 20  | 5348441 | 6257797    | 4573030     | 1684767    | 8449509 40 |
| 21  | 5350898 | 6253203    | 4566594     | 1686609    | 8447953 39 |
| 22  | 5353355 | 6248612    | 4560160     | 1688452    | 8446396 38 |
| 23  | 5355812 | 6244024    | 4553728     | 1690296    | 8444838 37 |
| 24  | 5358268 | 6239439    | 4547298     | 1692141    | 8443280 36 |
| 25  | 5360724 | 6234857    | 4540859     | 1693988    | 8441721 35 |
| 26  | 5363179 | 6230278    | 4534442     | 1695836    | 8440161 34 |
| 27  | 5365634 | 6225702    | 4528017     | 1697685    | 8438600 33 |
| 28  | 5368088 | 6221129    | 4521594     | 1699535    | 8437039 32 |
| 29  | 5370542 | 6216559    | 4515172     | 1701387    | 8435477 31 |
| 30  | 5372996 | 6211992    | 4508752     | 1703240    | 8433915 30 |

Gr. 32

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus      |
|-----|---------|------------|-------------|------------|------------|
| 30  | 5372996 | 6211992    | 4508752     | 1703240    | 8433915 30 |
| 31  | 5375449 | 6207427    | 4502333     | 1705094    | 8432352 29 |
| 32  | 5377902 | 6202865    | 4495916     | 1706949    | 8430788 28 |
| 33  | 5380354 | 6198306    | 4489501     | 1708805    | 8429223 27 |
| 34  | 5382806 | 6193750    | 4483088     | 1710662    | 8427658 26 |
| 35  | 5385258 | 6189197    | 4476676     | 1712521    | 8426092 25 |
| 36  | 5387709 | 6184647    | 4470266     | 1714381    | 8424525 24 |
| 37  | 5390159 | 6180100    | 4463858     | 1716242    | 8422957 23 |
| 38  | 5392609 | 6175556    | 4457452     | 1718104    | 8421389 22 |
| 39  | 5395058 | 6171015    | 4451048     | 1719967    | 8419820 21 |
| 40  | 5397507 | 6166477    | 4444646     | 1721831    | 8418250 20 |
| 41  | 5399955 | 6161942    | 4438245     | 1723697    | 8416679 19 |
| 42  | 5402403 | 6157409    | 4431845     | 1725564    | 8415108 18 |
| 43  | 5404851 | 6152879    | 4425447     | 1727432    | 8413536 17 |
| 44  | 5407298 | 6148352    | 4419051     | 1729301    | 8411963 16 |
| 45  | 5409745 | 6143828    | 4412656     | 1731172    | 8410390 15 |
| 46  | 5412191 | 6139307    | 4406263     | 1733044    | 8418816 14 |
| 47  | 5414637 | 6134789    | 4399872     | 1734917    | 8417241 13 |
| 48  | 5417082 | 6130274    | 4393483     | 1736791    | 8415666 12 |
| 49  | 5419527 | 6125762    | 4387096     | 1738666    | 8414090 11 |
| 50  | 5421972 | 6121253    | 4380711     | 1740542    | 8412513 10 |
| 51  | 5424416 | 6116747    | 4374327     | 1742420    | 8410935 9  |
| 52  | 5426859 | 6112244    | 4367945     | 1744299    | 8409357 8  |
| 53  | 5429302 | 6107744    | 4361565     | 1746179    | 8407778 7  |
| 54  | 5431745 | 6103246    | 4355186     | 1748060    | 8406199 6  |
| 55  | 5434187 | 6098751    | 4348809     | 1749942    | 8404619 5  |
| 56  | 5436629 | 6094259    | 4342433     | 1751826    | 8403038 4  |
| 57  | 5439070 | 6089770    | 4336059     | 1753711    | 8401456 3  |
| 58  | 5441510 | 6085284    | 4329687     | 1755597    | 8400873 2  |
| 59  | 5443950 | 6080800    | 4323316     | 1757484    | 8400290 1  |
| 60  | 5446390 | 6076319    | 4316947     | 1759372    | 8400706 0  |



Gr.

33

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus      |
|-----|---------|------------|-------------|------------|------------|
| 0   | 5446390 | 6076319    | 4316947     | 1759372    | 8386706160 |
| 1   | 5448829 | 6071841    | 4310579     | 1761262    | 838512159  |
| 2   | 5451268 | 6067366    | 4304213     | 1763153    | 838353658  |
| 3   | 5453707 | 6062894    | 4297849     | 1765045    | 838195057  |
| 4   | 5456145 | 6058425    | 4291487     | 1766938    | 838036856  |
| 5   | 5458583 | 6053958    | 4285126     | 1768832    | 837877655  |
| 6   | 5461020 | 6049494    | 4278766     | 1770728    | 837718854  |
| 7   | 5463456 | 6045033    | 4272408     | 1772625    | 837559953  |
| 8   | 5465892 | 6040575    | 4266052     | 1774523    | 837400952  |
| 9   | 5468328 | 6036120    | 4259698     | 1776422    | 837241951  |
| 10  | 5470763 | 6031668    | 4253346     | 1778322    | 837082850  |
| 11  | 5473198 | 6027218    | 4246994     | 1780224    | 836923649  |
| 12  | 5475632 | 6022771    | 4240644     | 1782127    | 836764448  |
| 13  | 5478066 | 6018327    | 4234296     | 1784031    | 836605147  |
| 14  | 5480499 | 6013886    | 4227950     | 1785936    | 836445746  |
| 15  | 5482932 | 6009448    | 4221605     | 1787845    | 836286245  |
| 16  | 5485364 | 6005013    | 4215262     | 1789751    | 836126644  |
| 17  | 5487796 | 6000580    | 4208920     | 1791660    | 835967043  |
| 18  | 5490228 | 5996150    | 4202580     | 1793570    | 835807342  |
| 19  | 5492659 | 5991723    | 4196241     | 1795482    | 835647641  |
| 20  | 5495090 | 5987299    | 4189904     | 1797395    | 835487840  |
| 21  | 5497520 | 5982878    | 4183569     | 1799309    | 835327939  |
| 22  | 5499950 | 5978460    | 4177236     | 1801224    | 835168038  |
| 23  | 5502379 | 5974044    | 4170904     | 1803140    | 835008037  |
| 24  | 5504808 | 5969631    | 4164573     | 1805058    | 834847936  |
| 25  | 5507236 | 5965221    | 4158244     | 1806977    | 834687735  |
| 26  | 5509664 | 5960814    | 4151917     | 1808897    | 834527434  |
| 27  | 5512091 | 5956409    | 4145591     | 1810818    | 834367133  |
| 28  | 5514518 | 5952007    | 4139267     | 1812740    | 834206732  |
| 29  | 5516944 | 5947608    | 4132944     | 1814664    | 834046331  |
| 30  | 5519370 | 5943212    | 4126623     | 1816589    | 833885830  |

56

Gr.

33

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus     |
|-----|---------|------------|-------------|------------|-----------|
| 30  | 5519370 | 5943212    | 4126623     | 1816589    | 833885830 |
| 31  | 5521795 | 5938829    | 4120314     | 1818515    | 833725229 |
| 32  | 5524220 | 5934438    | 4113996     | 1820442    | 833564628 |
| 33  | 5526645 | 5930050    | 4107680     | 1822370    | 833403927 |
| 34  | 5529069 | 5925665    | 4101366     | 1824299    | 833243126 |
| 35  | 5531493 | 5921273    | 4095043     | 1826230    | 833082225 |
| 36  | 5533916 | 5916893    | 4088731     | 1828162    | 832921224 |
| 37  | 5536338 | 5912516    | 4082421     | 1830095    | 832760223 |
| 38  | 5538760 | 5908142    | 4076113     | 1832029    | 832599122 |
| 39  | 5541182 | 5903771    | 4069807     | 1833964    | 832438021 |
| 40  | 5543603 | 5899402    | 4063501     | 1835901    | 832276820 |
| 41  | 5546024 | 5895036    | 4057197     | 1837839    | 832115519 |
| 42  | 5548444 | 5890673    | 4050895     | 1839778    | 831954118 |
| 43  | 5550864 | 5886313    | 4044594     | 1841719    | 831792717 |
| 44  | 5553283 | 5881955    | 4038294     | 1843661    | 831631216 |
| 45  | 5555702 | 5877600    | 4031996     | 1845604    | 831469615 |
| 46  | 5558120 | 5873248    | 4025700     | 1847548    | 831307914 |
| 47  | 5560538 | 5868899    | 4019405     | 1849494    | 831146213 |
| 48  | 5562956 | 5864552    | 4013111     | 1851441    | 830984412 |
| 49  | 5565373 | 5860208    | 4006819     | 1853389    | 830822611 |
| 50  | 5567790 | 5855867    | 4000529     | 1855338    | 830660710 |
| 51  | 5570206 | 5851529    | 3994241     | 1857288    | 830498709 |
| 52  | 5572622 | 5847193    | 3987953     | 1859240    | 830336708 |
| 53  | 5575037 | 5842860    | 3981667     | 1861193    | 830174607 |
| 54  | 5577452 | 5838530    | 3975383     | 1863147    | 830012406 |
| 55  | 5579866 | 5834203    | 3969101     | 1865102    | 829850105 |
| 56  | 5582280 | 5829878    | 3962819     | 1867059    | 829687704 |
| 57  | 5584693 | 5825556    | 3956539     | 1869017    | 829525303 |
| 58  | 5587106 | 5821237    | 3950261     | 1870976    | 829362802 |
| 59  | 5589518 | 5816920    | 3943984     | 1872936    | 829200201 |
| 60  | 5591929 | 5812606    | 3937709     | 1874897    | 829037600 |

I 3

56

mi.

Gr.

56



| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 5591929 | 5812606    | 3937709     | 1874897    | 8290376 |
| 1   | 5594340 | 5808295    | 3931435     | 1876860    | 8288794 |
| 2   | 5596751 | 5803987    | 3925163     | 1878814    | 8287121 |
| 3   | 5599161 | 5799681    | 3918892     | 1880789    | 8285493 |
| 4   | 5601571 | 5795378    | 3912623     | 1882755    | 8283864 |
| 5   | 5603981 | 5791078    | 3906355     | 1884723    | 8282234 |
| 6   | 5606390 | 5786780    | 3900088     | 1886692    | 8280603 |
| 7   | 5608798 | 5782485    | 3893813     | 1888662    | 8278972 |
| 8   | 5611206 | 5778192    | 3887559     | 1890633    | 8277340 |
| 9   | 5613614 | 5773902    | 3881297     | 1892605    | 8275708 |
| 10  | 5616021 | 5769615    | 3875036     | 1894579    | 8274075 |
| 11  | 5618427 | 5765330    | 3868776     | 1896554    | 8272441 |
| 12  | 5620833 | 5761048    | 3862518     | 1898530    | 8270806 |
| 13  | 5623239 | 5756769    | 3856261     | 1900508    | 8269170 |
| 14  | 5625644 | 5752493    | 3850006     | 1902487    | 8267534 |
| 15  | 5628049 | 5748219    | 3843752     | 1904467    | 8265897 |
| 16  | 5630453 | 5743948    | 3837500     | 1906448    | 8264259 |
| 17  | 5632857 | 5739680    | 3831249     | 1908431    | 8262621 |
| 18  | 5635260 | 5735414    | 3824999     | 1910415    | 8260982 |
| 19  | 5637663 | 5731151    | 3818751     | 1912400    | 8259343 |
| 20  | 5640066 | 5726891    | 3812505     | 1914386    | 8257703 |
| 21  | 5642468 | 5722634    | 3806261     | 1916373    | 8256062 |
| 22  | 5644869 | 5718379    | 3800017     | 1918362    | 8254421 |
| 23  | 5647270 | 5714127    | 3793775     | 1920352    | 8252779 |
| 24  | 5649670 | 5709878    | 3787538     | 1922343    | 8251136 |
| 25  | 5652070 | 5705631    | 3781296     | 1924335    | 8249492 |
| 26  | 5654469 | 5701387    | 3775059     | 1926328    | 8247847 |
| 27  | 5656868 | 5697145    | 3768822     | 1928323    | 8246202 |
| 28  | 5659266 | 5692906    | 3762587     | 1930319    | 8244556 |
| 29  | 5661664 | 5688670    | 3756354     | 1932316    | 8242909 |
| 30  | 5664062 | 5684436    | 3750122     | 1934314    | 8241262 |

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 5666462 | 5684436    | 3750122     | 1934314    | 8241262 |
| 31  | 5666459 | 5680205    | 3743891     | 1936314    | 8239614 |
| 32  | 5668856 | 5675976    | 3737661     | 1938315    | 8237965 |
| 33  | 5671252 | 5671750    | 3731433     | 1940317    | 8236316 |
| 34  | 5673648 | 5667527    | 3725206     | 1942321    | 8234666 |
| 35  | 5676043 | 5663306    | 3718980     | 1944326    | 8233015 |
| 36  | 5678438 | 5659088    | 3712756     | 1946332    | 8231363 |
| 37  | 5680832 | 5654872    | 3706532     | 1948340    | 8229711 |
| 38  | 5683226 | 5650659    | 3700310     | 1950349    | 8228058 |
| 39  | 5685619 | 5646449    | 3694090     | 1952359    | 8226405 |
| 40  | 5688012 | 5642241    | 3687871     | 1954370    | 8224751 |
| 41  | 5690404 | 5638036    | 3681653     | 1956383    | 8223096 |
| 42  | 5692796 | 5633834    | 3675437     | 1958398    | 8221440 |
| 43  | 5695187 | 5629635    | 3669223     | 1960412    | 8219784 |
| 44  | 5697578 | 5625438    | 3663010     | 1962428    | 8218127 |
| 45  | 5699968 | 5621244    | 3656799     | 1964445    | 8216469 |
| 46  | 5702358 | 5617052    | 3650588     | 1966464    | 8214810 |
| 47  | 5704747 | 5612863    | 3644379     | 1968484    | 8213151 |
| 48  | 5707136 | 5608676    | 3638171     | 1970505    | 8211491 |
| 49  | 5709524 | 5604492    | 3631965     | 1972527    | 8209831 |
| 50  | 5711912 | 5600311    | 3625761     | 1974550    | 8208170 |
| 51  | 5714289 | 5596132    | 3619557     | 1976575    | 8206508 |
| 52  | 5716686 | 5591956    | 3613355     | 1978601    | 8204846 |
| 53  | 5719072 | 5587782    | 3607154     | 1980628    | 8203183 |
| 54  | 5721458 | 5583611    | 3600954     | 1982657    | 8201519 |
| 55  | 5723844 | 5579443    | 3594756     | 1984687    | 8199854 |
| 56  | 5726229 | 5575277    | 3588559     | 1986718    | 8198188 |
| 57  | 5728613 | 5571114    | 3582364     | 1988750    | 8196522 |
| 58  | 5730997 | 5566953    | 3576169     | 1990784    | 8194855 |
| 59  | 5733381 | 5562795    | 3569976     | 1992819    | 8193188 |
| 60  | 5735764 | 5558639    | 3563784     | 1994855    | 8191520 |



Gr.

35

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus      |
|-----|---------|------------|-------------|------------|------------|
| 0   | 5735764 | 5558619    | 3563784     | 1994855    | 8161520 60 |
| 1   | 5738147 | 5554186    | 3557594     | 1996892    | 8189851 59 |
| 2   | 5740529 | 5550330    | 3551405     | 1998931    | 8188152 58 |
| 3   | 5742911 | 5546188    | 3545217     | 2000971    | 8186512 57 |
| 4   | 5745292 | 5542043    | 3539031     | 2003012    | 8184841 56 |
| 5   | 5747672 | 5537900    | 3531846     | 2005054    | 8183170 55 |
| 6   | 5750052 | 5533760    | 3526662     | 2007098    | 8181498 54 |
| 7   | 5752432 | 5529622    | 3520479     | 2009143    | 8179825 53 |
| 8   | 5754811 | 5525487    | 3514298     | 2011189    | 8178151 52 |
| 9   | 5757190 | 5521354    | 3508118     | 2013236    | 8176477 51 |
| 10  | 5759568 | 5517224    | 3501939     | 2015285    | 8174802 50 |
| 11  | 5761946 | 5513096    | 3495761     | 2017335    | 8173126 49 |
| 12  | 5764323 | 5508971    | 3489585     | 2019386    | 8171449 48 |
| 13  | 5766700 | 5504849    | 3483410     | 2021439    | 8169772 47 |
| 14  | 5769076 | 5500729    | 3477236     | 2023493    | 8168094 46 |
| 15  | 5771452 | 5496612    | 3471064     | 2025548    | 8166416 45 |
| 16  | 5773827 | 5492497    | 3464892     | 2027605    | 8164737 44 |
| 17  | 5776202 | 5488385    | 3458722     | 2029663    | 8163057 43 |
| 18  | 5778576 | 5484275    | 3452553     | 2031722    | 8161376 42 |
| 19  | 5780950 | 5480168    | 3446386     | 2033782    | 8159695 41 |
| 20  | 5783324 | 5476063    | 3440219     | 2035844    | 8158013 40 |
| 21  | 5785697 | 5471961    | 3434054     | 2037907    | 8156330 39 |
| 22  | 5788069 | 5467861    | 3427890     | 2039971    | 8154647 38 |
| 23  | 5790441 | 5463764    | 3421728     | 2042036    | 8152963 37 |
| 24  | 5792812 | 5459669    | 3415566     | 2044103    | 8151278 36 |
| 25  | 5795183 | 5455577    | 3409406     | 2046171    | 8149593 35 |
| 26  | 5797553 | 5451488    | 3403248     | 2048240    | 8147907 34 |
| 27  | 5799923 | 5447401    | 3397090     | 2050311    | 8146220 33 |
| 28  | 5802292 | 5443317    | 3390934     | 2052383    | 8144532 32 |
| 29  | 5804661 | 5439235    | 3384779     | 2054456    | 8142848 31 |
| 30  | 5807030 | 5435156    | 3378626     | 2056530    | 8141155 30 |

Gr.

35

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus      |
|-----|---------|------------|-------------|------------|------------|
| 30  | 5807030 | 5435156    | 3378626     | 2056530    | 8141155 30 |
| 31  | 5809398 | 5431079    | 3372473     | 2058606    | 8139465 29 |
| 32  | 5811766 | 5427005    | 3366422     | 2060683    | 8137775 28 |
| 33  | 5814133 | 5422933    | 3360172     | 2062761    | 8136084 27 |
| 34  | 5816499 | 5418864    | 3354024     | 2064840    | 8134393 26 |
| 35  | 5818865 | 5414797    | 3347877     | 2066920    | 8132701 25 |
| 36  | 5821230 | 5410733    | 3341731     | 2069002    | 8131008 24 |
| 37  | 5823595 | 5406671    | 3335586     | 2071085    | 8129314 23 |
| 38  | 5825959 | 5402612    | 3329443     | 2073169    | 8127620 22 |
| 39  | 5828323 | 5398555    | 3323300     | 2075255    | 8125925 21 |
| 40  | 5830687 | 5394501    | 3317159     | 2077342    | 8124229 20 |
| 41  | 5833050 | 5390449    | 3311019     | 2079430    | 8122532 19 |
| 42  | 5835412 | 5386400    | 3304880     | 2081520    | 8120835 18 |
| 43  | 5837774 | 5382353    | 3298742     | 2083611    | 8119137 17 |
| 44  | 5840136 | 5378308    | 3292605     | 2085703    | 8117439 16 |
| 45  | 5842497 | 5374266    | 3286470     | 2087796    | 8115740 15 |
| 46  | 5844858 | 5370226    | 3280335     | 2089891    | 8114040 14 |
| 47  | 5847218 | 5366189    | 3274202     | 2091987    | 8112339 13 |
| 48  | 5849578 | 5362154    | 3268070     | 2094084    | 8110638 12 |
| 49  | 5851937 | 5358122    | 3261939     | 2096183    | 8108936 11 |
| 50  | 5854295 | 5354093    | 3255810     | 2098283    | 8107234 10 |
| 51  | 5856653 | 5350067    | 3249683     | 2100384    | 8105531 9  |
| 52  | 5859010 | 5346043    | 3243557     | 2102486    | 8103827 8  |
| 53  | 5861367 | 5342021    | 3237431     | 2104590    | 8102122 7  |
| 54  | 5863724 | 5338002    | 3231307     | 2106695    | 8100417 6  |
| 55  | 5866080 | 5333985    | 3225184     | 2108801    | 8098711 5  |
| 56  | 5868436 | 5329970    | 3219061     | 2110909    | 8097004 4  |
| 57  | 5870791 | 5325958    | 3212940     | 2113018    | 8095296 3  |
| 58  | 5873145 | 5321948    | 3206820     | 2115128    | 8093588 2  |
| 59  | 5875499 | 5317940    | 3200700     | 2117240    | 8091879 1  |
| 60  | 5877852 | 5313935    | 3194582     | 2119353    | 8090170 0  |



Gr. 36

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 5877852 | 5313935    | 3194582     | 2119353    | 8090170 |
| 1   | 5880205 | 5309932    | 3188465     | 2121467    | 8089460 |
| 2   | 5882558 | 5305932    | 3182350     | 2123582    | 8086749 |
| 3   | 5884910 | 5301935    | 3176236     | 2125699    | 8085038 |
| 4   | 5887262 | 5297940    | 3170123     | 2127817    | 8083326 |
| 5   | 5889613 | 5293947    | 3164011     | 2129936    | 8081613 |
| 6   | 5891964 | 5289957    | 3157900     | 2132057    | 8079899 |
| 7   | 5894314 | 5285969    | 3151790     | 2134179    | 8078185 |
| 8   | 5896664 | 5281984    | 3145682     | 2136302    | 8076470 |
| 9   | 5899013 | 5278001    | 3139575     | 2138426    | 8074754 |
| 10  | 5901361 | 5274020    | 3133468     | 2140552    | 8073038 |
| 11  | 5903709 | 5270042    | 3127363     | 2142679    | 8071321 |
| 12  | 5906056 | 5266066    | 3121259     | 2144807    | 8069603 |
| 13  | 5908403 | 5262092    | 3115155     | 2146937    | 8067885 |
| 14  | 5910750 | 5258121    | 3109053     | 2149068    | 8066166 |
| 15  | 5913096 | 5254152    | 3102952     | 2151200    | 8064446 |
| 16  | 5915442 | 5250186    | 3096853     | 2153333    | 8062726 |
| 17  | 5917787 | 5246222    | 3090754     | 2155468    | 8061005 |
| 18  | 5920132 | 5242261    | 3084657     | 2157604    | 8059283 |
| 19  | 5922476 | 5238302    | 3078561     | 2159741    | 8057561 |
| 20  | 5924820 | 5234346    | 3072466     | 2161880    | 8055838 |
| 21  | 5927163 | 5230392    | 3066372     | 2164020    | 8054114 |
| 22  | 5929505 | 5226441    | 3060280     | 2166161    | 8052389 |
| 23  | 5931847 | 5222492    | 3054188     | 2168304    | 8050664 |
| 24  | 5934189 | 5218545    | 3048097     | 2170448    | 8048938 |
| 25  | 5936530 | 5214601    | 3042008     | 2172593    | 8047212 |
| 26  | 5938871 | 5210659    | 3035919     | 2174740    | 8045485 |
| 27  | 5941211 | 5206720    | 3029832     | 2176888    | 8043757 |
| 28  | 5943551 | 5202783    | 3023746     | 2179037    | 8042028 |
| 29  | 5945890 | 5198848    | 3017660     | 2181188    | 8040299 |
| 30  | 5948228 | 5194916    | 3011576     | 2183340    | 8038569 |

Gr. 36

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 5948228 | 5194916    | 3011576     | 2183340    | 8038569 |
| 31  | 5950566 | 5190986    | 3005493     | 2185493    | 8036838 |
| 32  | 5952904 | 5187059    | 2999412     | 2187647    | 8035107 |
| 33  | 5955241 | 5183134    | 2993331     | 2189803    | 8033375 |
| 34  | 5957578 | 5179211    | 2987251     | 2191960    | 8031642 |
| 35  | 5959914 | 5175291    | 2981173     | 2194118    | 8029909 |
| 36  | 5962250 | 5171373    | 2975095     | 2196278    | 8028175 |
| 37  | 5964585 | 5167457    | 2969018     | 2198439    | 8026440 |
| 38  | 5966919 | 5163544    | 2962943     | 2200601    | 8024705 |
| 39  | 5969253 | 5159633    | 2956868     | 2202765    | 8022969 |
| 40  | 5971586 | 5155724    | 2950794     | 2204930    | 8021232 |
| 41  | 5973919 | 5151818    | 2944721     | 2207096    | 8019494 |
| 42  | 5976251 | 5147914    | 2938650     | 2209264    | 8017756 |
| 43  | 5978583 | 5144012    | 2932579     | 2211433    | 8016017 |
| 44  | 5980915 | 5140113    | 2926510     | 2213603    | 8014278 |
| 45  | 5983246 | 5136216    | 2920442     | 2215774    | 8012538 |
| 46  | 5985577 | 5132322    | 2914375     | 2217947    | 8010797 |
| 47  | 5987907 | 5128430    | 2908309     | 2220121    | 8009056 |
| 48  | 5990237 | 5124540    | 2902244     | 2222296    | 8007314 |
| 49  | 5992566 | 5120653    | 2896180     | 2224473    | 8005571 |
| 50  | 5994894 | 5116768    | 2890117     | 2226651    | 8003828 |
| 51  | 5997222 | 5112886    | 2884056     | 2228830    | 8002084 |
| 52  | 5999549 | 5109006    | 2877995     | 2231011    | 8000339 |
| 53  | 6001876 | 5105128    | 2871935     | 2233193    | 7998593 |
| 54  | 6004202 | 5101253    | 2865877     | 2235376    | 7996847 |
| 55  | 6006528 | 5097380    | 2859819     | 2237561    | 7995100 |
| 56  | 6008853 | 5093509    | 2853762     | 2239747    | 7993352 |
| 57  | 6011178 | 5089641    | 2847706     | 2241935    | 7991604 |
| 58  | 6013502 | 5085775    | 2841651     | 2244124    | 7989855 |
| 59  | 6015826 | 5081911    | 2835597     | 2246314    | 7988105 |
| 60  | 6018150 | 5078050    | 2829544     | 2248506    | 7986355 |



| 37 | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|----|---------|------------|-------------|------------|---------|
| 0  | 6018150 | 5078050    | 2829544     | 2248506    | 7986355 |
| 1  | 6020473 | 5074191    | 2823492     | 2250699    | 7984604 |
| 2  | 6022796 | 5070334    | 2817441     | 2252893    | 7982852 |
| 3  | 6025118 | 5066479    | 2811391     | 2255088    | 7981100 |
| 4  | 6027439 | 5062627    | 2805342     | 2257285    | 7979347 |
| 5  | 6029760 | 5058777    | 2799294     | 2259483    | 7977593 |
| 6  | 6032080 | 5054929    | 2793247     | 2261682    | 7975838 |
| 7  | 6034400 | 5051084    | 2787201     | 2263883    | 7974084 |
| 8  | 6036719 | 5047241    | 2781156     | 2266085    | 7972328 |
| 9  | 6039038 | 5043401    | 2775113     | 2268288    | 7970572 |
| 10 | 6041357 | 5039563    | 2769071     | 2270492    | 7968815 |
| 11 | 6043675 | 5035727    | 2763029     | 2272698    | 7967057 |
| 12 | 6045992 | 5031894    | 2756989     | 2274905    | 7965299 |
| 13 | 6048309 | 5028063    | 2750949     | 2277114    | 7963540 |
| 14 | 6050625 | 5024234    | 2744910     | 2279324    | 7961780 |
| 15 | 6052940 | 5020408    | 2738873     | 2281535    | 7960020 |
| 16 | 6055255 | 5016584    | 2732836     | 2283748    | 7958259 |
| 17 | 6057570 | 5012762    | 2726800     | 2285962    | 7956497 |
| 18 | 6059884 | 5008942    | 2720764     | 2288178    | 7954735 |
| 19 | 6062198 | 5005125    | 2714730     | 2290395    | 7952972 |
| 20 | 6064511 | 5001310    | 2708696     | 2292614    | 7951208 |
| 21 | 6066824 | 4997497    | 2702663     | 2294834    | 7949443 |
| 22 | 6069136 | 4993687    | 2696632     | 2297055    | 7947678 |
| 23 | 6071448 | 4989879    | 2690602     | 2299277    | 7945912 |
| 24 | 6073759 | 4986073    | 2684573     | 2301500    | 7944146 |
| 25 | 6076069 | 4982270    | 2678545     | 2303725    | 7942379 |
| 26 | 6078379 | 4978469    | 2672518     | 2305951    | 7940611 |
| 27 | 6080688 | 4974670    | 2666492     | 2308178    | 7938842 |
| 28 | 6082997 | 4970873    | 2660467     | 2310406    | 7937073 |
| 29 | 6085306 | 4967079    | 2654444     | 2312635    | 7935303 |
| 30 | 6087614 | 4963287    | 2648421     | 2314866    | 7933533 |

| 37 | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|----|---------|------------|-------------|------------|---------|
| 30 | 6087614 | 4963287    | 2648421     | 2314866    | 7933533 |
| 31 | 6089922 | 4959497    | 2642399     | 2317098    | 7931762 |
| 32 | 6092229 | 4955710    | 2636378     | 2319332    | 7929990 |
| 33 | 6094536 | 4951925    | 2630358     | 2321567    | 7928218 |
| 34 | 6096842 | 4948142    | 2624338     | 2323804    | 7926445 |
| 35 | 6099147 | 4944361    | 2618319     | 2326042    | 7924671 |
| 36 | 6101452 | 4940582    | 2612301     | 2328281    | 7922896 |
| 37 | 6103756 | 4936806    | 2606284     | 2330522    | 7921121 |
| 38 | 6106060 | 4933032    | 2600268     | 2332764    | 7919345 |
| 39 | 6108364 | 4929260    | 2594252     | 2335008    | 7917569 |
| 40 | 6110667 | 4925490    | 2588237     | 2337253    | 7915792 |
| 41 | 6112970 | 4921723    | 2582224     | 2339499    | 7914014 |
| 42 | 6115272 | 4917958    | 2576211     | 2341747    | 7912235 |
| 43 | 6117573 | 4914195    | 2570199     | 2343996    | 7910456 |
| 44 | 6119873 | 4910435    | 2564189     | 2346246    | 7908676 |
| 45 | 6122173 | 4906677    | 2558179     | 2348498    | 7906896 |
| 46 | 6124473 | 4902921    | 2552170     | 2350751    | 7905114 |
| 47 | 6126772 | 4899168    | 2546163     | 2353005    | 7903332 |
| 48 | 6129071 | 4895417    | 2540156     | 2355261    | 7901550 |
| 49 | 6131369 | 4891668    | 2534150     | 2357518    | 7899767 |
| 50 | 6133667 | 4887921    | 2528145     | 2359776    | 7897983 |
| 51 | 6135964 | 4884177    | 2522141     | 2362036    | 7896198 |
| 52 | 6138261 | 4880435    | 2516138     | 2364297    | 7894413 |
| 53 | 6140557 | 4876695    | 2510136     | 2366559    | 7892627 |
| 54 | 6142853 | 4872957    | 2504134     | 2368823    | 7890841 |
| 55 | 6145148 | 4869222    | 2498134     | 2371088    | 7889054 |
| 56 | 6147442 | 4865489    | 2492135     | 2373354    | 7887266 |
| 57 | 6149746 | 4861758    | 2486136     | 2375622    | 7885477 |
| 58 | 6152030 | 4858029    | 2480138     | 2377891    | 7883688 |
| 59 | 6154323 | 4854302    | 2474140     | 2380162    | 7881898 |
| 60 | 6156615 | 4850578    | 2468144     | 2382434    | 7880108 |



Gr. 38

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 6156615 | 4850578    | 2468144     | 2382434    | 7880108 |
| 1   | 6158907 | 4846856    | 2462149     | 2384707    | 7878317 |
| 2   | 6161198 | 4843136    | 2456154     | 2386982    | 7876525 |
| 3   | 6163489 | 4839418    | 2450160     | 2389258    | 7874732 |
| 4   | 6165781 | 4835702    | 2444167     | 2391535    | 7872939 |
| 5   | 6168070 | 4831989    | 2438175     | 2393814    | 7871145 |
| 6   | 6170259 | 4828278    | 2432184     | 2396094    | 7869350 |
| 7   | 6172648 | 4824569    | 2426193     | 2398376    | 7867555 |
| 8   | 6174936 | 4820862    | 2420203     | 2400659    | 7865759 |
| 9   | 6177224 | 4817158    | 2414215     | 2402943    | 7863963 |
| 10  | 6179512 | 4813456    | 2408227     | 2405229    | 7862166 |
| 11  | 6181799 | 4809756    | 2402240     | 2407516    | 7860368 |
| 12  | 6184085 | 4806058    | 2396254     | 2409804    | 7858569 |
| 13  | 6186371 | 4802363    | 2390269     | 2412094    | 7856770 |
| 14  | 6188656 | 4798670    | 2384285     | 2414385    | 7854970 |
| 15  | 6190940 | 4794979    | 2378301     | 2416678    | 7853169 |
| 16  | 6193224 | 4791290    | 2372318     | 2418972    | 7851368 |
| 17  | 6195508 | 4787603    | 2366336     | 2421267    | 7849566 |
| 18  | 6197791 | 4783919    | 2360355     | 2423564    | 7847764 |
| 19  | 6200074 | 4780237    | 2354375     | 2425862    | 7845961 |
| 20  | 6202356 | 4776557    | 2348396     | 2428161    | 7844157 |
| 21  | 6204638 | 4772880    | 2342418     | 2430462    | 7842352 |
| 22  | 6206919 | 4769205    | 2336441     | 2432764    | 7840547 |
| 23  | 6209199 | 4765532    | 2330465     | 2435067    | 7838741 |
| 24  | 6211479 | 4761861    | 2324489     | 2437372    | 7836935 |
| 25  | 6213758 | 4758192    | 2318514     | 2439678    | 7835128 |
| 26  | 6216037 | 4754525    | 2312539     | 2441986    | 7833320 |
| 27  | 6218315 | 4750860    | 2306565     | 2444295    | 7831511 |
| 28  | 6220593 | 4747198    | 2300593     | 2446605    | 7829702 |
| 29  | 6222870 | 4743538    | 2294621     | 2448917    | 7827892 |
| 30  | 6225146 | 4739880    | 2288650     | 2451230    | 7826082 |

51

Gr. 38

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 6225146 | 4739880    | 2288650     | 2451230    | 7826082 |
| 31  | 6227422 | 4736224    | 2282680     | 2453544    | 7824271 |
| 32  | 6229698 | 4732571    | 2276711     | 2455860    | 7822459 |
| 33  | 6231973 | 4728920    | 2270743     | 2458177    | 7820647 |
| 34  | 6234248 | 4725271    | 2264775     | 2460496    | 7818834 |
| 35  | 6236522 | 4721624    | 2258808     | 2462816    | 7817020 |
| 36  | 6238796 | 4717979    | 2252842     | 2465137    | 7815205 |
| 37  | 6241069 | 4714336    | 2246876     | 2467460    | 7813390 |
| 38  | 6243342 | 4710695    | 2240911     | 2469784    | 7811574 |
| 39  | 6245614 | 4707056    | 2234946     | 2472110    | 7809758 |
| 40  | 6247885 | 4703419    | 2228982     | 2474437    | 7807941 |
| 41  | 6250156 | 4699785    | 2223020     | 2476765    | 7806123 |
| 42  | 6252426 | 4696153    | 2217058     | 2479095    | 7804304 |
| 43  | 6254696 | 4692523    | 2211097     | 2481426    | 7802485 |
| 44  | 6256966 | 4688895    | 2205136     | 2483759    | 7800665 |
| 45  | 6259235 | 4685269    | 2199176     | 2486093    | 7798845 |
| 46  | 6261503 | 4681645    | 2193217     | 2488428    | 7797024 |
| 47  | 6263771 | 4678024    | 2187259     | 2490765    | 7795202 |
| 48  | 6266038 | 4674405    | 2181302     | 2493103    | 7793380 |
| 49  | 6268305 | 4670788    | 2175345     | 2495443    | 7791557 |
| 50  | 6270572 | 4667173    | 2169389     | 2497784    | 7789733 |
| 51  | 6272838 | 4663561    | 2163435     | 2500126    | 7787909 |
| 52  | 6275103 | 4659951    | 2157481     | 2502470    | 7786084 |
| 53  | 6277368 | 4656343    | 2151528     | 2504815    | 7784258 |
| 54  | 6279632 | 4652737    | 2145575     | 2507162    | 7782432 |
| 55  | 6281895 | 4649133    | 2139623     | 2509510    | 7780605 |
| 56  | 6284158 | 4645531    | 2133672     | 2511859    | 7778777 |
| 57  | 6286420 | 4641931    | 2127721     | 2514210    | 7776949 |
| 58  | 6288682 | 4638334    | 2121772     | 2516562    | 7775120 |
| 59  | 6290943 | 4634739    | 2115824     | 2518915    | 7773290 |
| 60  | 6293204 | 4631146    | 2109876     | 2521270    | 7771460 |

51

mi.  
Gr.  
51



| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 6293204 | 4631146    | 2109876     | 2521270    | 7771460 |
| 1   | 6295464 | 4627555    | 2103929     | 2525626    | 7769629 |
| 2   | 6297724 | 4623966    | 2097982     | 2529984    | 7767797 |
| 3   | 6299983 | 4620379    | 2092036     | 2534343    | 7765965 |
| 4   | 6302242 | 4616794    | 2086091     | 2538703    | 7764132 |
| 5   | 6304501 | 4613211    | 2080146     | 2543065    | 7762299 |
| 6   | 6306759 | 4609630    | 2074202     | 2547428    | 7760465 |
| 7   | 6309016 | 4606052    | 2068259     | 2551793    | 7758630 |
| 8   | 6311273 | 4602476    | 2062317     | 2556159    | 7756794 |
| 9   | 6313529 | 4598902    | 2056376     | 2560526    | 7754958 |
| 10  | 6315784 | 4595330    | 2050435     | 2564895    | 7753121 |
| 11  | 6318039 | 4591760    | 2044495     | 2569265    | 7751283 |
| 12  | 6320293 | 4588192    | 2038555     | 2573637    | 7749445 |
| 13  | 6322547 | 4584627    | 2032617     | 2578010    | 7747606 |
| 14  | 6324800 | 4581064    | 2026679     | 2582385    | 7745766 |
| 15  | 6327053 | 4577503    | 2020742     | 2586761    | 7743926 |
| 16  | 6329305 | 4573944    | 2014806     | 2591138    | 7742085 |
| 17  | 6331557 | 4570387    | 2008870     | 2595517    | 7740244 |
| 18  | 6333808 | 4566832    | 2002935     | 2599897    | 7738402 |
| 19  | 6336059 | 4563279    | 1997000     | 2604279    | 7736559 |
| 20  | 6338310 | 4559728    | 1991066     | 2608662    | 7734716 |
| 21  | 6340560 | 4556179    | 1985133     | 2613046    | 7732872 |
| 22  | 6342809 | 4552632    | 1979200     | 2617432    | 7731028 |
| 23  | 6345058 | 4549088    | 1973269     | 2621819    | 7729183 |
| 24  | 6347309 | 4545546    | 1967338     | 2626208    | 7727337 |
| 25  | 6349553 | 4542006    | 1961408     | 2630598    | 7725490 |
| 26  | 6351800 | 4538468    | 1955478     | 2634990    | 7723642 |
| 27  | 6354046 | 4534932    | 1949549     | 2639383    | 7721794 |
| 28  | 6356292 | 4531398    | 1943621     | 2643777    | 7719945 |
| 29  | 6358537 | 4527866    | 1937693     | 2648173    | 7718096 |
| 30  | 6360782 | 4524336    | 1931766     | 2652570    | 7716246 |

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 6360782 | 4524336    | 1931766     | 2652570    | 7716246 |
| 31  | 6363026 | 4520808    | 1925839     | 2656969    | 7714395 |
| 32  | 6365270 | 4517282    | 1919913     | 2661369    | 7712544 |
| 33  | 6367513 | 4513758    | 1913988     | 2665770    | 7710692 |
| 34  | 6369756 | 4510236    | 1908063     | 2670173    | 7708839 |
| 35  | 6371999 | 4506717    | 1902140     | 2674577    | 7706986 |
| 36  | 6374241 | 4503200    | 1896217     | 2678983    | 7705132 |
| 37  | 6376482 | 4499685    | 1890295     | 2683390    | 7703277 |
| 38  | 6378722 | 4496172    | 1884373     | 2687799    | 7701422 |
| 39  | 6380962 | 4492661    | 1878452     | 2692209    | 7699566 |
| 40  | 6383201 | 4489152    | 1872531     | 2696621    | 7697710 |
| 41  | 6385440 | 4485645    | 1866611     | 2701034    | 7695853 |
| 42  | 6387678 | 4482140    | 1860692     | 2705448    | 7693995 |
| 43  | 6389916 | 4478637    | 1854773     | 2709864    | 7692137 |
| 44  | 6392153 | 4475136    | 1848855     | 2714281    | 7690278 |
| 45  | 6394390 | 4471637    | 1842937     | 2718699    | 7688418 |
| 46  | 6396626 | 4468140    | 1837020     | 2723120    | 7686559 |
| 47  | 6398862 | 4464646    | 1831105     | 2727541    | 7684697 |
| 48  | 640109  | 4461154    | 1825190     | 2731964    | 7682835 |
| 49  | 6403332 | 4457664    | 1819276     | 2736388    | 7680973 |
| 50  | 6405566 | 4454176    | 1813363     | 2740813    | 7679110 |
| 51  | 6407799 | 4450690    | 1807450     | 2745240    | 7677246 |
| 52  | 6410032 | 4447206    | 1801537     | 2749669    | 7675381 |
| 53  | 6412264 | 4443724    | 1795625     | 2754099    | 7673517 |
| 54  | 6414496 | 4440244    | 1789714     | 2758530    | 7671652 |
| 55  | 6416728 | 4436766    | 1783803     | 2762963    | 7669786 |
| 56  | 6418959 | 4433290    | 1777893     | 2767397    | 7667919 |
| 57  | 6421189 | 4429816    | 1771983     | 2771833    | 7666051 |
| 58  | 6423419 | 4426344    | 1766074     | 2776270    | 7664183 |
| 59  | 6425648 | 4422875    | 1760166     | 2780709    | 7662314 |
| 60  | 6427876 | 4419408    | 1754259     | 2785149    | 7660445 |



| Gr. | 40      |            |             |            |         |    |
|-----|---------|------------|-------------|------------|---------|----|
| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |    |
| 0   | 6427876 | 4419408    | 1754259     | 2665149    | 7660445 | 60 |
| 1   | 6430104 | 4415943    | 1748353     | 2667590    | 7658575 | 59 |
| 2   | 6432221 | 4412480    | 1742447     | 2670033    | 7656704 | 58 |
| 3   | 6434358 | 4409019    | 1736542     | 2672477    | 7654833 | 57 |
| 4   | 6436785 | 4405560    | 1730637     | 2674923    | 7652961 | 56 |
| 5   | 6439011 | 4402103    | 1724733     | 2677370    | 7651088 | 55 |
| 6   | 6441236 | 4398648    | 1718829     | 2679819    | 7649215 | 54 |
| 7   | 6443461 | 4395195    | 1712926     | 2682269    | 7647341 | 53 |
| 8   | 6445685 | 4391743    | 1707022     | 2684721    | 7645466 | 52 |
| 9   | 6447909 | 4388293    | 1701119     | 2687174    | 7643591 | 51 |
| 10  | 6450132 | 4384845    | 1695216     | 2689629    | 7641715 | 50 |
| 11  | 6452355 | 4381399    | 1689314     | 2692085    | 7639838 | 49 |
| 12  | 6454577 | 4377955    | 1683412     | 2694543    | 7637960 | 48 |
| 13  | 6456792 | 4374514    | 1677512     | 2697002    | 7636082 | 47 |
| 14  | 6459020 | 4371075    | 1671613     | 2699462    | 7634204 | 46 |
| 15  | 6461240 | 4367638    | 1665714     | 2701924    | 7632325 | 45 |
| 16  | 6463460 | 4364203    | 1659816     | 2704387    | 7630445 | 44 |
| 17  | 6465679 | 4360770    | 1653918     | 2706852    | 7628564 | 43 |
| 18  | 6467898 | 4357339    | 1648021     | 2709318    | 7626683 | 42 |
| 19  | 6470116 | 4353910    | 1642124     | 2711786    | 7624802 | 41 |
| 20  | 6472333 | 4350483    | 1636228     | 2714255    | 7622920 | 40 |
| 21  | 6474550 | 4347058    | 1630332     | 2716726    | 7621037 | 39 |
| 22  | 6476766 | 4343635    | 1624437     | 2719198    | 7619153 | 38 |
| 23  | 6478982 | 4340214    | 1618542     | 2721672    | 7617269 | 37 |
| 24  | 6481198 | 4336795    | 1612648     | 2724147    | 7615384 | 36 |
| 25  | 6483413 | 4333378    | 1606755     | 2726623    | 7613498 | 35 |
| 26  | 6485628 | 4329963    | 1600862     | 2729101    | 7611612 | 34 |
| 27  | 6487842 | 4326550    | 1594970     | 2731580    | 7609725 | 33 |
| 28  | 6490055 | 4323139    | 1589078     | 2734061    | 7607837 | 32 |
| 29  | 6492268 | 4319730    | 1583187     | 2736543    | 7605949 | 31 |
| 30  | 6494480 | 4316323    | 1577296     | 2739027    | 7604060 | 30 |

| Gr. | 40      |            |             |            |         |    |
|-----|---------|------------|-------------|------------|---------|----|
| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |    |
| 30  | 6494480 | 4316323    | 1577296     | 2739027    | 7604060 | 30 |
| 31  | 6496692 | 4312919    | 1571407     | 2741512    | 7602170 | 29 |
| 32  | 6498903 | 4309517    | 1565518     | 2743999    | 7600280 | 28 |
| 33  | 6501114 | 4306116    | 1559629     | 2746487    | 7598389 | 27 |
| 34  | 6503324 | 4302717    | 1553740     | 2748977    | 7596498 | 26 |
| 35  | 6505533 | 4299320    | 1547852     | 2751468    | 7594606 | 25 |
| 36  | 6507742 | 4295925    | 1541964     | 2753961    | 7592713 | 24 |
| 37  | 6509950 | 4292532    | 1536077     | 2756455    | 7590819 | 23 |
| 38  | 6512158 | 4289141    | 1530191     | 2758950    | 7588925 | 22 |
| 39  | 6514365 | 4285752    | 1524305     | 2761447    | 7587031 | 21 |
| 40  | 6516572 | 4282365    | 1518420     | 2763945    | 7585136 | 20 |
| 41  | 6518778 | 4278980    | 1512535     | 2766445    | 7583240 | 19 |
| 42  | 6520984 | 4275597    | 1506651     | 2768946    | 7581343 | 18 |
| 43  | 6523189 | 4272216    | 1500767     | 2771449    | 7579446 | 17 |
| 44  | 6525394 | 4268837    | 1494884     | 2773953    | 7577548 | 16 |
| 45  | 6527598 | 4265460    | 1489001     | 2776459    | 7575650 | 15 |
| 46  | 6529801 | 4262085    | 1483119     | 2778966    | 7573751 | 14 |
| 47  | 6532004 | 4258712    | 1477237     | 2781475    | 7571851 | 13 |
| 48  | 6534206 | 4255341    | 1471356     | 2783985    | 7569951 | 12 |
| 49  | 6536408 | 4251972    | 1465476     | 2786496    | 7568050 | 11 |
| 50  | 6538609 | 4248605    | 1459596     | 2789009    | 7566148 | 10 |
| 51  | 6540809 | 4245240    | 1453717     | 2791523    | 7564246 | 9  |
| 52  | 6543009 | 4241877    | 1447838     | 2794039    | 7562343 | 8  |
| 53  | 6545208 | 4238516    | 1441960     | 2796556    | 7560439 | 7  |
| 54  | 6547407 | 4235157    | 1436082     | 2799075    | 7558535 | 6  |
| 55  | 6549606 | 4231800    | 1430205     | 2801595    | 7556630 | 5  |
| 56  | 6551804 | 4228445    | 1424328     | 2804117    | 7554724 | 4  |
| 57  | 6554001 | 4225092    | 1418451     | 2806641    | 7552818 | 3  |
| 58  | 6556198 | 4221741    | 1412575     | 2809166    | 7550911 | 2  |
| 59  | 6558394 | 4218392    | 1406699     | 2811693    | 7549004 | 1  |
| 60  | 6560590 | 4215044    | 1400823     | 2814221    | 7547096 | 0  |



Gr.

41

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 6560590 | 4215044    | 1400823     | 2814221    | 7547096 |
| 1   | 6562785 | 4211698    | 1394947     | 2816751    | 7545187 |
| 2   | 6564979 | 4208354    | 1389072     | 2819282    | 7543277 |
| 3   | 6567173 | 4205012    | 1383197     | 2821815    | 7541367 |
| 4   | 6569367 | 4201672    | 1377323     | 2824349    | 7539457 |
| 5   | 6571560 | 4198334    | 1371450     | 2826884    | 7537546 |
| 6   | 6573753 | 4194999    | 1365578     | 2829421    | 7535634 |
| 7   | 6575945 | 4191666    | 1359707     | 2831959    | 7533721 |
| 8   | 6578136 | 4188335    | 1353836     | 2834499    | 7531808 |
| 9   | 6580326 | 4185006    | 1347966     | 2837040    | 7529894 |
| 10  | 6582516 | 4181679    | 1342097     | 2839582    | 7527980 |
| 11  | 6584705 | 4178354    | 1336228     | 2842126    | 7526065 |
| 12  | 6586894 | 4175030    | 1330358     | 2844672    | 7524149 |
| 13  | 6589082 | 4171708    | 1324489     | 2847219    | 7522233 |
| 14  | 6591270 | 4168388    | 1318620     | 2849768    | 7520316 |
| 15  | 6593458 | 4165070    | 1312752     | 2852318    | 7518398 |
| 16  | 6595645 | 4161754    | 1306884     | 2854870    | 7516480 |
| 17  | 6597831 | 4158440    | 1401017     | 2857423    | 7514561 |
| 18  | 6600016 | 4155128    | 1295150     | 2859978    | 7512643 |
| 19  | 6602201 | 4151818    | 1289284     | 2862534    | 7510722 |
| 20  | 6604386 | 4148510    | 1283418     | 2865092    | 7508801 |
| 21  | 6606570 | 4145204    | 1277551     | 2867651    | 7506879 |
| 22  | 6608753 | 4141900    | 1271688     | 2870212    | 7504957 |
| 23  | 6610936 | 4138598    | 1265814     | 2872774    | 7503034 |
| 24  | 6613118 | 4135298    | 1259960     | 2875338    | 7501111 |
| 25  | 6615300 | 4132000    | 1254097     | 2877903    | 7499187 |
| 26  | 6617481 | 4128703    | 1248233     | 2880470    | 7497262 |
| 27  | 6619661 | 4125408    | 1242370     | 2883038    | 7495336 |
| 28  | 6621841 | 4122115    | 1236507     | 2885608    | 7493410 |
| 29  | 6624021 | 4118824    | 1230645     | 2888179    | 7491484 |
| 30  | 6626200 | 4115535    | 1224783     | 2890752    | 7489557 |

48

Gr.

41

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 6626200 | 4115535    | 1224783     | 2890752    | 7489557 |
| 31  | 6628379 | 4112248    | 1218922     | 2893326    | 7487629 |
| 32  | 6630557 | 4108963    | 1213061     | 2895902    | 7485700 |
| 33  | 6632734 | 4105680    | 1207201     | 2898479    | 7483771 |
| 34  | 6634911 | 4102399    | 1201341     | 2901058    | 7481842 |
| 35  | 6637087 | 4099120    | 1195482     | 2903638    | 7479912 |
| 36  | 6639263 | 4095843    | 1189623     | 2906220    | 7477981 |
| 37  | 6641438 | 4092567    | 1183763     | 2908804    | 7476049 |
| 38  | 6643612 | 4089293    | 1177904     | 2911389    | 7474117 |
| 39  | 6645786 | 4086021    | 1172045     | 2913976    | 7472184 |
| 40  | 6647959 | 4082751    | 1166187     | 2916564    | 7470251 |
| 41  | 6650132 | 4079483    | 1160329     | 2919154    | 7468317 |
| 42  | 6652304 | 4076217    | 1154472     | 2921745    | 7466382 |
| 43  | 6654476 | 4072953    | 1148615     | 2924338    | 7464447 |
| 44  | 6656647 | 4069691    | 1142759     | 2926932    | 7462511 |
| 45  | 6658817 | 4066431    | 1136904     | 2929527    | 7460574 |
| 46  | 6660987 | 4063173    | 1131049     | 2932124    | 7458637 |
| 47  | 6663156 | 4059917    | 1125195     | 2934722    | 7456699 |
| 48  | 6665325 | 4056663    | 1119341     | 2937322    | 7454761 |
| 49  | 6667493 | 4053410    | 1113487     | 2939923    | 7452822 |
| 50  | 6669661 | 4050159    | 1107633     | 2942526    | 7450882 |
| 51  | 6671828 | 4046910    | 1101780     | 2945130    | 7448941 |
| 52  | 6673994 | 4043663    | 1095927     | 2947736    | 7447000 |
| 53  | 6676160 | 4040418    | 1090074     | 2950344    | 7445058 |
| 54  | 6678326 | 4037175    | 1084222     | 2952953    | 7443116 |
| 55  | 6680491 | 4033934    | 1078370     | 2955564    | 7441173 |
| 56  | 6682655 | 4030695    | 1072518     | 2958177    | 7439229 |
| 57  | 6684818 | 4027458    | 1066667     | 2960791    | 7437284 |
| 58  | 6686981 | 4024223    | 1060816     | 2963407    | 7435339 |
| 59  | 6689144 | 4020990    | 1054966     | 2966024    | 7433394 |
| 60  | 6691306 | 4017759    | 1049116     | 2968643    | 7431448 |

L 3 48

mi.  
Gr.  
48



Gr.

42

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 6691306 | 4017759    | 1049116     | 2968643    | 7431448 |
| 1   | 6693468 | 4014529    | 1043266     | 2971263    | 7429501 |
| 2   | 6695629 | 4011301    | 1037416     | 2973885    | 7427553 |
| 3   | 6697789 | 4008075    | 1031567     | 2976508    | 7425605 |
| 4   | 6699949 | 4004851    | 1025718     | 2979133    | 7423657 |
| 5   | 6702108 | 4001629    | 1019870     | 2981759    | 7421708 |
| 6   | 6704267 | 3998409    | 1014023     | 2984386    | 7419758 |
| 7   | 6706425 | 3995191    | 1008176     | 2987015    | 7417807 |
| 8   | 6708582 | 3991974    | 1002329     | 2989645    | 7415856 |
| 9   | 6710739 | 3988759    | 996482      | 2992277    | 7413905 |
| 10  | 6712895 | 3985546    | 990636      | 2994910    | 7411953 |
| 11  | 6715051 | 3982335    | 984790      | 2997545    | 7410000 |
| 12  | 6717206 | 3979126    | 978944      | 3000182    | 7408046 |
| 13  | 6719361 | 3975919    | 973099      | 3002820    | 7406092 |
| 14  | 6721515 | 3972714    | 967254      | 3005460    | 7404137 |
| 15  | 6723668 | 3969511    | 961409      | 3008102    | 7402181 |
| 16  | 6725821 | 3966310    | 955565      | 3010745    | 7400225 |
| 17  | 6727973 | 3963110    | 949720      | 3013390    | 7398268 |
| 18  | 6730125 | 3959912    | 943876      | 3016036    | 7396311 |
| 19  | 6732276 | 3956716    | 938032      | 3018684    | 7394353 |
| 20  | 6734427 | 3953522    | 932189      | 3021333    | 7392394 |
| 21  | 6736577 | 3950330    | 926346      | 3023984    | 7390435 |
| 22  | 6738726 | 3947140    | 920504      | 3026636    | 7388475 |
| 23  | 6740875 | 3943951    | 914661      | 3029290    | 7386515 |
| 24  | 6743024 | 3940764    | 908819      | 3031945    | 7384554 |
| 25  | 6745172 | 3937579    | 902977      | 3034602    | 7382592 |
| 26  | 6747319 | 3934396    | 897135      | 3037261    | 7380629 |
| 27  | 6749465 | 3931215    | 891294      | 3039921    | 7378666 |
| 28  | 6751611 | 3928036    | 885453      | 3042583    | 7376702 |
| 29  | 6753757 | 3924859    | 879613      | 3045246    | 7374738 |
| 30  | 6755902 | 3921684    | 873773      | 3047911    | 7372773 |

Gr.

42

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 6755902 | 3921684    | 873773      | 3047911    | 7372773 |
| 31  | 6758047 | 3918511    | 867934      | 3050577    | 7370807 |
| 32  | 6760191 | 3915339    | 862094      | 3053245    | 7368841 |
| 33  | 6762334 | 3912169    | 856255      | 3055914    | 7366874 |
| 34  | 6764477 | 3909001    | 850416      | 3058585    | 7364907 |
| 35  | 6766619 | 3905835    | 844577      | 3061258    | 7362939 |
| 36  | 6768760 | 3902671    | 838739      | 3063932    | 7360970 |
| 37  | 6770901 | 3899509    | 832901      | 3066608    | 7359001 |
| 38  | 6773041 | 3896348    | 827063      | 3069285    | 7357031 |
| 39  | 6775181 | 3893189    | 821225      | 3071964    | 7355061 |
| 40  | 6777320 | 3890032    | 815388      | 3074644    | 7353090 |
| 41  | 6779459 | 3886877    | 809551      | 3077326    | 7351118 |
| 42  | 6781597 | 3883723    | 803714      | 3080009    | 7349145 |
| 43  | 6783734 | 3880571    | 797877      | 3082694    | 7347173 |
| 44  | 6785871 | 3877421    | 792041      | 3085380    | 7345199 |
| 45  | 6788007 | 3874273    | 786205      | 3088068    | 7343225 |
| 46  | 6790143 | 3871127    | 780369      | 3090758    | 7341250 |
| 47  | 6792278 | 3867983    | 774534      | 3093449    | 7339274 |
| 48  | 6794413 | 3864841    | 768699      | 3096142    | 7337298 |
| 49  | 6796547 | 3861701    | 762865      | 3098836    | 7335322 |
| 50  | 6798681 | 3858563    | 757031      | 3101532    | 7333345 |
| 51  | 6800814 | 3855426    | 751197      | 3104229    | 7331367 |
| 52  | 6802946 | 3852291    | 745363      | 3106928    | 7329388 |
| 53  | 6805078 | 3849158    | 739529      | 3109629    | 7327409 |
| 54  | 6807209 | 3846027    | 733696      | 3112331    | 7325429 |
| 55  | 6809340 | 3842898    | 727863      | 3115035    | 7323449 |
| 56  | 6811470 | 3839770    | 722029      | 3117741    | 7321468 |
| 57  | 6813599 | 3836644    | 716196      | 3120448    | 7319486 |
| 58  | 6815728 | 3833520    | 710363      | 3123157    | 7317504 |
| 59  | 6817856 | 3830398    | 704530      | 3125868    | 7315521 |
| 60  | 6819984 | 3827278    | 698698      | 3128580    | 7313537 |



Gr. 43

| 43<br>m. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|----------|---------|------------|-------------|------------|---------|
| 0        | 6819984 | 3827278    | 698698      | 3028580    | 7313537 |
| 1        | 6822111 | 3824160    | 692866      | 3131294    | 7311553 |
| 2        | 6824237 | 3821044    | 687035      | 3134009    | 7309568 |
| 3        | 6826363 | 3817929    | 681203      | 3136726    | 7307583 |
| 4        | 6828489 | 3814816    | 675372      | 3139444    | 7305597 |
| 5        | 6830614 | 3811705    | 669541      | 3142164    | 7303610 |
| 6        | 6832738 | 3808596    | 663711      | 3144885    | 7301623 |
| 7        | 6834861 | 3805488    | 657880      | 3147608    | 7299635 |
| 8        | 6836984 | 3802382    | 652050      | 3150332    | 7297647 |
| 9        | 6839107 | 3799278    | 646221      | 3153057    | 7295658 |
| 10       | 6841229 | 3796176    | 640392      | 3155784    | 7293668 |
| 11       | 6843350 | 3793075    | 634562      | 3158513    | 7291678 |
| 12       | 6845471 | 3789976    | 628732      | 3161244    | 7289687 |
| 13       | 6847591 | 3786879    | 622903      | 3163976    | 7287695 |
| 14       | 6849711 | 3783784    | 617074      | 3166710    | 7285703 |
| 15       | 6851830 | 3780691    | 611246      | 3169445    | 7283710 |
| 16       | 6853949 | 3777600    | 605418      | 3172182    | 7281721 |
| 17       | 6856067 | 3774510    | 599589      | 3174921    | 7279731 |
| 18       | 6858184 | 3771422    | 593760      | 3177662    | 7277743 |
| 19       | 6860301 | 3768336    | 587932      | 3180404    | 7275753 |
| 20       | 6862417 | 3765252    | 582104      | 3183148    | 7273763 |
| 21       | 6864533 | 3762170    | 576277      | 3185893    | 7271771 |
| 22       | 6866648 | 3759090    | 570450      | 3188640    | 7269779 |
| 23       | 6868762 | 3756011    | 564622      | 3191389    | 7267786 |
| 24       | 6870876 | 3752934    | 558795      | 3194139    | 7265793 |
| 25       | 6872989 | 3749859    | 552968      | 3196891    | 7263800 |
| 26       | 6875102 | 3746786    | 547142      | 3199644    | 7261807 |
| 27       | 6877214 | 3743714    | 541315      | 3202399    | 7259813 |
| 28       | 6879325 | 3740644    | 535489      | 3205155    | 7257819 |
| 29       | 6881436 | 3737576    | 529663      | 3207913    | 7255825 |
| 30       | 6883546 | 3734510    | 523838      | 3210672    | 7253830 |

Gr. 43

| 43<br>m. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|----------|---------|------------|-------------|------------|---------|
| 30       | 6885656 | 3731446    | 518013      | 3213435    | 7251835 |
| 31       | 6887765 | 3728383    | 512187      | 3216196    | 7249842 |
| 32       | 6889874 | 3725322    | 506361      | 3218961    | 7247849 |
| 33       | 6891982 | 3722263    | 500536      | 3221727    | 7245856 |
| 34       | 6894089 | 3719206    | 494711      | 3224495    | 7243863 |
| 35       | 6896196 | 3716150    | 488886      | 3227264    | 7241870 |
| 36       | 6898302 | 3713096    | 483061      | 3230035    | 7239877 |
| 37       | 6900408 | 3710044    | 477236      | 3232808    | 7237884 |
| 38       | 6902513 | 3706994    | 471411      | 3235583    | 7235891 |
| 39       | 6904617 | 3703946    | 465587      | 3238359    | 7233898 |
| 40       | 6906721 | 3700899    | 459762      | 3241137    | 7231905 |
| 41       | 6908824 | 3697854    | 453938      | 3243916    | 7229912 |
| 42       | 6910927 | 3694811    | 448114      | 3246697    | 7227919 |
| 43       | 6913029 | 3691770    | 442291      | 3249479    | 7225926 |
| 44       | 6915131 | 3688730    | 436467      | 3252263    | 7223933 |
| 45       | 6917232 | 3685692    | 430644      | 3255048    | 7221940 |
| 46       | 6919332 | 3682656    | 424821      | 3257835    | 7219947 |
| 47       | 6921432 | 3679622    | 418999      | 3260623    | 7217954 |
| 48       | 6923531 | 3676590    | 413177      | 3263413    | 7215961 |
| 49       | 6925630 | 3673559    | 407355      | 3266204    | 7213968 |
| 50       | 6927728 | 3670530    | 401533      | 3268997    | 7211975 |
| 51       | 6929825 | 3667503    | 395711      | 3271792    | 7209982 |
| 52       | 6931922 | 3664478    | 389889      | 3274589    | 7207989 |
| 53       | 6934018 | 3661454    | 384067      | 3277387    | 7205996 |
| 54       | 6936114 | 3658432    | 378245      | 3280187    | 7203999 |
| 55       | 6938209 | 3655412    | 372423      | 3282989    | 7201999 |
| 56       | 6940303 | 3652394    | 366602      | 3285792    | 7199999 |
| 57       | 6942397 | 3649377    | 360780      | 3288597    | 7197999 |
| 58       | 6944491 | 3646362    | 354958      | 3291404    | 7195999 |
| 59       | 6946584 | 3643349    | 349136      | 3294213    | 7193999 |



Gr. 44

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 0   | 6946584 | 3643342    | 349136      | 3294213    | 7123398 |
| 1   | 6948676 | 3640338    | 243315      | 3297023    | 7121377 |
| 2   | 6950767 | 3637329    | 337494      | 3299835    | 7119355 |
| 3   | 6952858 | 3634321    | 331673      | 3302648    | 7117333 |
| 4   | 6954949 | 3631311    | 325852      | 3305460    | 7115310 |
| 5   | 6957039 | 3628311    | 320032      | 3308272    | 7113287 |
| 6   | 6959128 | 3625308    | 314211      | 3311097    | 7111263 |
| 7   | 6961216 | 3622307    | 308390      | 3313917    | 7109238 |
| 8   | 6963304 | 3619308    | 302570      | 3316738    | 7107213 |
| 9   | 6965392 | 3616311    | 296750      | 3319561    | 7105187 |
| 10  | 6967479 | 3613315    | 290930      | 3322385    | 7103161 |
| 11  | 6969565 | 3610321    | 285110      | 3325211    | 7101134 |
| 12  | 6971651 | 3607329    | 279290      | 3328039    | 7099106 |
| 13  | 6973736 | 3604338    | 273469      | 3330869    | 7097078 |
| 14  | 6975821 | 3601349    | 267649      | 3333700    | 7095049 |
| 15  | 6977905 | 3598362    | 261829      | 3336533    | 7093019 |
| 16  | 6979988 | 3595377    | 256009      | 3339368    | 7090989 |
| 17  | 6982071 | 3592394    | 250190      | 3342204    | 7088958 |
| 18  | 6984153 | 3589412    | 244370      | 3345042    | 7086927 |
| 19  | 6986235 | 3586432    | 238550      | 3347882    | 7084895 |
| 20  | 6988316 | 3583454    | 232731      | 3350723    | 7082863 |
| 21  | 6990396 | 3580478    | 226912      | 3353566    | 7080830 |
| 22  | 6992476 | 3577504    | 221093      | 3356411    | 7078796 |
| 23  | 6994555 | 3574531    | 215274      | 3359257    | 7076762 |
| 24  | 6996634 | 3571560    | 209455      | 3362105    | 7074727 |
| 25  | 6998712 | 3568590    | 203635      | 3364955    | 7072691 |
| 26  | 7000789 | 3565622    | 197816      | 3367806    | 7070655 |
| 27  | 7002866 | 3562656    | 191997      | 3370659    | 7068618 |
| 28  | 7004942 | 3559691    | 186178      | 3373513    | 7066581 |
| 29  | 7007018 | 3556728    | 180359      | 3376369    | 7064543 |
| 30  | 7009093 | 3553767    | 174541      | 3379226    | 7062504 |

Gr. 44

| mi. | Sinus   | Logarithmi | Differentia | Logarithmi | Sinus   |
|-----|---------|------------|-------------|------------|---------|
| 30  | 7009093 | 3553767    | 174541      | 3379226    | 7062504 |
| 31  | 7011167 | 3550808    | 168723      | 3382085    | 7060465 |
| 32  | 7013241 | 3547851    | 162905      | 3384946    | 7058425 |
| 33  | 7015314 | 3544895    | 157087      | 3387808    | 7056385 |
| 34  | 7017387 | 3541941    | 151269      | 3390672    | 7054344 |
| 35  | 7019459 | 3538989    | 145451      | 3393538    | 7052303 |
| 36  | 7021530 | 3536038    | 139633      | 3396406    | 7050261 |
| 37  | 7023601 | 3533089    | 133814      | 3399275    | 7048218 |
| 38  | 7025671 | 3530142    | 127996      | 3402146    | 7046175 |
| 39  | 7027741 | 3527197    | 122178      | 3405019    | 7044131 |
| 40  | 7029810 | 3524243    | 116359      | 3407894    | 7042086 |
| 41  | 7031879 | 3521311    | 110541      | 3410770    | 7040041 |
| 42  | 7033947 | 3518371    | 104723      | 3413648    | 7037995 |
| 43  | 7036014 | 3515432    | 98904       | 3416528    | 7035949 |
| 44  | 7038081 | 3512495    | 93086       | 3419409    | 7033902 |
| 45  | 7040147 | 3509560    | 87268       | 3422292    | 7031854 |
| 46  | 7042213 | 3506626    | 81450       | 3425176    | 7029806 |
| 47  | 7044278 | 3503694    | 75632       | 3428062    | 7027757 |
| 48  | 7046342 | 3500764    | 69824       | 3430940    | 7025708 |
| 49  | 7048406 | 3497835    | 64006       | 3433829    | 7023658 |
| 50  | 7050469 | 3494908    | 58178       | 3436730    | 7021607 |
| 51  | 7052532 | 3491983    | 52360       | 3439623    | 7019556 |
| 52  | 7054594 | 3489060    | 46543       | 3442517    | 7017504 |
| 53  | 7056655 | 3486139    | 40726       | 3445413    | 7015452 |
| 54  | 7058716 | 3483219    | 34908       | 3448311    | 7013399 |
| 55  | 7060776 | 3480301    | 29090       | 3451211    | 7011345 |
| 56  | 7062836 | 3477385    | 23273       | 3454112    | 7009291 |
| 57  | 7064895 | 3474470    | 17455       | 3457015    | 7007236 |
| 58  | 7066953 | 3471557    | 11637       | 3459920    | 7005181 |
| 59  | 7069011 | 3468645    | 5818        | 3462827    | 7003125 |
| 60  | 7071068 | 3465735    | 0           | 3465735    | 7001068 |



MIRIFICI  
LOGARITHMORVM  
CANONIS CON-  
STRUCTIO;

ET EORVM AD NATVRALES  
ipforum numeros habitudines;

*VNA CVM APPENDICE, DE ALIA  
eâque præstantiore Logarithmorum specie condenda.*

Quibus accessere Propositiones ad triangula sphæ-  
rica faciliore calculo resoluenda:

*Vnâ cum Annotationibus aliquot doctissimi D. HENRICI  
BRIGGII in eas, & memoratam appendicem.*

Authore & Inuentore IOANNE NEPERO, Barone  
MERCHISTONII, &c. SCOTO.



LVGDVNI,  
Apud Bartholomæum Vincentium,  
sub Signo Victoriæ.

M. DC. XX.

*Cum privilegio Cesar. Mæiest. & Christ. Galliarum Regis.*





ROBERTVS NEPERVS  
AVCTORIS FILIVS LECTORI

MATHESEOS STUDIO.

S.



ANTE aliquot annos (Lector Philomathes) Mirifici Logarithmorum Canonis usum, memoriae semper colenda parens publici Iuris fecerat; eius verò syntaxin ac creandi methodum, ut ipse monuit. Pag. 7<sup>a</sup>. & ultimā Logarithmorum, certo consilio Typis committere noluit; donec quodnam esset eorum, qui in hoc doctrinae genere versati sunt; de hoc Canone Iudicium ac censura exploratum habuisset. Mihi verò, post ipsius ex hac vitā commigrationem certis decembris constat, Mathematicarum disciplinarum peritissimos nouum hoc Inuentum plurimi facere; & nihil eis gratius accidere posse, quàm si Mirifici huius Canonis constructio, aut ea saltem, quae ipsi aliquid lucis asferre possint, publicae utilitatis gratiā in lucem prodeant. Quamuis igitur mihi probe perspectum sit, ipsum authorem huic opusculo extremam manum non imposuisse; feci tamen quantum in me fuit, ut horum honestissimo desiderio satisficeret; eorumque studiis praesertim qui imbecilliores sunt, & in ipso lumine herere solent, hac in parte consuleretur. Nec dubito, quin hoc opus posthumum multò perfectius ac elatius in lucem produisset, si ipsi auctori patri charissimo (in quo, ex optimorum hominum sententiā, inter aliā praeclara hoc eximij eminebat, res difficillimas methodo certā & facili, quàm



4  
paucissimis expedire) Deus longiorem vitæ usuram concessisset. Habes igitur (Lector beneuole) in hoc libello, doctrinam constructionis Logarithmorum (quos hic numeros artificiales appellat? hunc enim tractatum, ante inuentam Logarithmorum vocem, apud se pro aliquot annos conscriptum habuerat) copiosissime explicatam? in qua eorum natura, symptomata, ac varia ad naturales eorum numeros habitudines perspicue demonstrantur. Visum est etiam ipsi syntaxi subnectere Appendicem quandam, de alia Logarithmorum specie multo præstantiore condenda, (cujus ipse Inuentor in Epistola Rabdologiæ suæ prefixa meminit) & in qua Logarithmus unitatis est 0. Hanc loco ultimo ultimus ejus labor excipit, ad ulteriorem Trigonometriæ suæ Logarithmica perfectionem spectans? nempe propositiones quadam eminentissimæ, in Triangulis sphericis non quadrantalibus resoluedis, absque eorum in quadrantalia aut rectangula diuisione, & absque casuum observatione: quas quidem Propositiones in ordinem redigere, & ordine demonstrare statuerat, nisi nobis morte præproperâ præceptus fuisset. Lucubrationes etiam aliquot, Mathematici excellentissimi D. Henrici Briggij publici apud Londinenses Professoris, in memoratas Propositiones, & nouam hanc Logarithmorum speciem, Typis mandari curauimus? qui noui huius Canonis supputandi laborem grauissimum, pro singulari amicitia quæ illi cum Patre meo L. M. intercessit, animo libentissimo in se suscepit; creandi methodo, & usum explanatione Inuentori relictis. Nunc autem ipso ex hac vita euocato, totius negotij onus doctissimi Briggij humeris incumbere, & Sparta hæc ornanda illi sorte quadam obtigisse videtur. Hisce interim (Lector) laboribus quibuscunque frui, & pro humanitate tua boni consulo. Vale.

MIRIFICI



# MIRIFICI LOGARITHMORVM CANONIS CONSTRUCTIO: (QVI ET TABULA ARTIFICIALIS AB AVTHORE deinceps appellatur) eorumque ad naturales ipsorum numeros habitudines.

## POSITIO PRIMA.



ABVLA \* Artificialis, est minima Tabula, cuius <sup>Logarithmorum</sup> operâ facillimo computa omnium Geometricarum dimensionum, motuumque sublimium habetur notitia.

Hæc meritò minima dicitur, quia Tabulam sinuum volumine non exsuperat: facillima, quia per eam omnes multiplicationes, diuisiones, extractionsque radicum grauiores euitantur: solis enim & perpaucis facillimisque additionibus, subtractionibus, & bipartitionibus omnes generaliter figuras motusque metitur.

Hæc è numeris proportionem continua progredientibus excerpitur.

Pos. 2. Continuarum progressionum, alia Arithmetica quæ per equalia intervalla progreditur: Alia Geometrica, quæ per inæqualia & proportionaliter crescentia, aut deficientia incedit.

Arithmetica progressio, vt 1, 2, 3, 4, 5, 6, 7, &c. vel 2, 4, 6, 8, 10,

A<sup>m</sup> 3



# 6 MIRIFICI LOGARITHM.

12, 14, 16, &c. Geometrica verò, vt 1, 2, 4, 8, 16, 32, 64, &c. vel 243, 81, 27, 9, 3, 1,

3. In progressionibus requiritur accuratio, & operis facilitas. Accuratio fit, pro fundamento numeros maiores accipiendo: maiores autem numeri ex minoribus facillime sunt adiectis cyphris.

Vt pro 100000, quem rudiores sinum maximum faciunt, eruditiores ponunt 1000000, quò meliùs omnium sinuuti discrimen exprimitur. Vnde & eodem nos pro sinu toto & maximo proportionalium Geometricorum vtimur.

4. In Tabulis computandis etiam ex numeris maioribus maximi fiant, interpositâ periodo inter numerum ipsum & cyphras adiectas.

Vt ex 1000000, nos initio computationis facimus 1000000.000000, ne minutissimus error frequenti multiplicatione in immensum cresceret.

5. In numeris periodo sic in se distinctis, quicquid post periodum notatur fractio est, cuius denominator est unitas cum tot cyphris post se, quot sunt figura post periodum.

Vt 10000000.04, valet idem, quod  $10000000 \frac{4}{100}$ . Item 25.803. idem quod  $25 \frac{803}{1000}$ . Item 9999998.0005021, idem valet quod  $9999998 \frac{5021}{10000000}$ . & sic de cæteris.

6. E Tabulis iam computatis, reici possunt fractiones post periodum locata, absque ullo sensibili errore. In magnis enim nostris numeris error insensibilis, & quasi nullus habetur, qui unitatem non exsuperat.

Vt completâ Tabulâ pro 9987643.8213051, qui sunt  $9987643 \frac{8213051}{10000000}$ , accipi possunt hi 9987643. absque sensibili errore.

7. Est præterea alia accurationis formula: quum scilicet quantitas ignota, seu numero inexplicabilis, inter terminos numerales pluribus unitatibus non differentes includitur.

Vt posuâ Diametro circuli partium 497, quia nescitur præcisè quot partium sit ambitus, ideo eruditiores ex Archimedis sententiâ, eum inter terminos 1562, & 1561 incluserunt. Item si costarum quadrati quælibet sit partium 1000, erit diagonalis radix

# CANONIS CONSTRUCTIO. 7

lis radix quadrata numeri 2000000, quæ cum sit numero inexplicabilis, idè per extractionem radice quadratæ quaruntur eius termini, scilicet 1415 terminus maior, & 1414 terminus minor, vel  $1414 \frac{604}{2828}$  maior, &  $1414 \frac{604}{1829}$  minor: videlicet quanto minor terminorum differentia sit, tanto maior accuratio.

8. Vice ipsarum quantitatum ignotarum, termini earum sunt addendi, subtrahendi, multiplicandi, aut diuidendi prout opus fuerit.
9. Adduntur bini alicuius quantitatis termini ad binos terminos alterius, quum minor illius minori huius, & maior illius maiori huius additur.

Vt sit linea  
abc, in duas a ————— b ————— c  
quantitates a  
b, & bc diuisa; sit ab inter terminos 123.5 maiorem, & 123.2 minorem: sitque bc inter terminos 43.2 maiorem, & 43.1 minorem. Additis ergo maiore ad maiorem, & minore ad minorem, fiet tota quantitas ac inter terminos 166.7 & 166.3.

Multiplicantur bini alicuius quantitatis termini per binos terminos alterius, quum minor illius in minorem huius, & maior illius in maiorem huius ducitur.

Vt sit altera quantitas ab, quæ sit inter terminos 10.502 maiorem, & 10.500 minorem; altera verò ac, quæ sit inter terminos 3.216 maiorem, & 3.215 minorem. Vnde ductis 10.502 in 3.216, & 10.500 in 3.215, pro-  
b ————— d  
venient termini 33.774432, & 33.757500; inter quos erit arca abcd.

10. Terminorum subtractio fit, terminum maiorem minoris quantitatis à minore maioris, & minorem minoris à maiore maioris auferendo.

Vt in schemate primo, si ex terminis ac, qui sunt 166.7 & 166.3, subduxeris terminos bc, qui sunt 43.2 & 43.1, fiet 123.6 & 123.1 pro terminis ab; & non 123.5 & 123.2. Nam licet etiam horum additio ad 43.2 & 43.1, producebat 166.7 & 166.3, (per octauam) non tamen è conuerso sequetur



# 8 MIRIFICI LOGARITHM.

queretur, quin aliquid possit esse inter 166.7 & 166.3, ex quo si subtraxeris aliquid quod sit inter 43.2 & 43.1, remaneret id quod non sit inter 123.5 & 123.2: verum non esse id inter terminos 123.6 & 123.1 est impossibile.

11. *Divisio fit, partiendo terminum maiorem diuidendi per minorem diuisoris, & minorem diuidendi per maiorem diuisoris.*

Vt in precedente figura, quadratum *abcd* inter terminos 33.774432 & 33.757500 constitutum diuidatur per terminos *ac*, qui sunt 3.216 & 3.215, prouenient 10.505.  $\frac{257}{3215}$  & 10.496  $\frac{2364}{3216}$  pro terminis *ab*; & non 10.502 & 10.500, eadem ratione, quam in subtractione diximus.

12. *Rudes terminorum fractiones delenda sunt addita unitate ad terminum maiorem.*

Vt pro terminis *a b* precedentibus, scilicet 10.505.  $\frac{257}{3215}$  & 10.496  $\frac{2364}{3216}$ , capiantur 10.506 & 10.496.

*Hactenus de accuratone, sequitur de facilitate operis.*

12. *Omnis progressionis Arithmetica facilis est constructio, Geometrica autem non omnis.*

Patet hoc, siquidem additione & subtractione fit facillime Arithmetica progressio: geometrica vero, difficillimis multiplicationibus, diuisionibus, & radicū extractionibus continuatur.

Sole Geometrica ille progressionis facile continuantur, qua per subtractionem facilis partis numeri a numero toto oriuntur.

14. *Partes numeri faciles dicimus, partes quaslibet cuius denominationes unitate & cyphris quotcunque notantur: habentur autem hae partes, reiciendo tot figuras ultimas principalis numeri, quot sunt cyphra in denominatore.*

Vt partes decima, centesima, millesima, 10000<sup>a</sup>, 100000<sup>a</sup>, 1000000<sup>a</sup>, 10000000<sup>a</sup>, faciles dicuntur, quia cuiuslibet numeri decima pars habetur delendo eius ultimam figuram; centesima duas ultimas, millesima tres ultimas figuras, & sic de ceteris, semper delendo tot figuras ultimas quot sunt cyphra in denominatione partis. Vt decima pars huius 99321 est 9932, eius autem centesima est 993, millesima 99, &c.

15. *Mediocriter etiam facile habentur partes dimidia, vigesima, ducenta,*

# CANONIS CONSTRUCTIO. 9

*Centesima, & alia per binarium & cyphras denominata; reiciendo tot figuras ultimas principalis numeri, quot sunt cyphra in denominatore, & reliquum bipartiendo.*

Vt numeri 9973218045 pars 2000<sup>a</sup> est 4986609, pars 20000<sup>a</sup> est 498660.

16. *Hinc sequitur, si a sinu toto septem cyphris aucto, ceterisque inde ortis suam 10000000<sup>am</sup> partem subtraxeris, continuari possunt quam facillime centum numeri, in ea proportionem Geometrica, quae est inter sinum totum & sinum eo minorem unitate, scilicet 10000000 & 9999999; hancque seriem proportionalium primam Tabulam nominamus.*

## Prima Tabula.

|                  |
|------------------|
| 10000000.0000000 |
| 1: 0000000       |
| 9999999.0000000  |
| 9999999          |
| 9999998.0000001  |
| 9999998          |
| 9999997.0000003  |
| 9999997          |
| 9999996.0000006  |
| 9999996          |
| 9999995.0000010  |
| 9999995          |
| 9999994.0000016  |
| 9999994          |
| 9999993.0000021  |
| 9999993          |
| 9999992.0000027  |
| 9999992          |
| 9999991.0000033  |
| 9999991          |
| 9999990.0000040  |
| 9999990          |
| 9999989.0000047  |
| 9999989          |
| 9999988.0000054  |
| 9999988          |
| 9999987.0000061  |
| 9999987          |
| 9999986.0000068  |
| 9999986          |
| 9999985.0000075  |
| 9999985          |
| 9999984.0000082  |
| 9999984          |
| 9999983.0000089  |
| 9999983          |
| 9999982.0000096  |
| 9999982          |
| 9999981.0000103  |
| 9999981          |
| 9999980.0000110  |
| 9999980          |
| 9999979.0000117  |
| 9999979          |
| 9999978.0000124  |
| 9999978          |
| 9999977.0000131  |
| 9999977          |
| 9999976.0000138  |
| 9999976          |
| 9999975.0000145  |
| 9999975          |
| 9999974.0000152  |
| 9999974          |
| 9999973.0000159  |
| 9999973          |
| 9999972.0000166  |
| 9999972          |
| 9999971.0000173  |
| 9999971          |
| 9999970.0000180  |
| 9999970          |
| 9999969.0000187  |
| 9999969          |
| 9999968.0000194  |
| 9999968          |
| 9999967.0000201  |
| 9999967          |
| 9999966.0000208  |
| 9999966          |
| 9999965.0000215  |
| 9999965          |
| 9999964.0000222  |
| 9999964          |
| 9999963.0000229  |
| 9999963          |
| 9999962.0000236  |
| 9999962          |
| 9999961.0000243  |
| 9999961          |
| 9999960.0000250  |
| 9999960          |
| 9999959.0000257  |
| 9999959          |
| 9999958.0000264  |
| 9999958          |
| 9999957.0000271  |
| 9999957          |
| 9999956.0000278  |
| 9999956          |
| 9999955.0000285  |
| 9999955          |
| 9999954.0000292  |
| 9999954          |
| 9999953.0000299  |
| 9999953          |
| 9999952.0000306  |
| 9999952          |
| 9999951.0000313  |
| 9999951          |
| 9999950.0000320  |
| 9999950          |
| 9999949.0000327  |
| 9999949          |
| 9999948.0000334  |
| 9999948          |
| 9999947.0000341  |
| 9999947          |
| 9999946.0000348  |
| 9999946          |
| 9999945.0000355  |
| 9999945          |
| 9999944.0000362  |
| 9999944          |
| 9999943.0000369  |
| 9999943          |
| 9999942.0000376  |
| 9999942          |
| 9999941.0000383  |
| 9999941          |
| 9999940.0000390  |
| 9999940          |
| 9999939.0000397  |
| 9999939          |
| 9999938.0000404  |
| 9999938          |
| 9999937.0000411  |
| 9999937          |
| 9999936.0000418  |
| 9999936          |
| 9999935.0000425  |
| 9999935          |
| 9999934.0000432  |
| 9999934          |
| 9999933.0000439  |
| 9999933          |
| 9999932.0000446  |
| 9999932          |
| 9999931.0000453  |
| 9999931          |
| 9999930.0000460  |
| 9999930          |
| 9999929.0000467  |
| 9999929          |
| 9999928.0000474  |
| 9999928          |
| 9999927.0000481  |
| 9999927          |
| 9999926.0000488  |
| 9999926          |
| 9999925.0000495  |
| 9999925          |
| 9999924.0000502  |
| 9999924          |
| 9999923.0000509  |
| 9999923          |
| 9999922.0000516  |
| 9999922          |
| 9999921.0000523  |
| 9999921          |
| 9999920.0000530  |
| 9999920          |
| 9999919.0000537  |
| 9999919          |
| 9999918.0000544  |
| 9999918          |
| 9999917.0000551  |
| 9999917          |
| 9999916.0000558  |
| 9999916          |
| 9999915.0000565  |
| 9999915          |
| 9999914.0000572  |
| 9999914          |
| 9999913.0000579  |
| 9999913          |
| 9999912.0000586  |
| 9999912          |
| 9999911.0000593  |
| 9999911          |
| 9999910.0000600  |
| 9999910          |
| 9999909.0000607  |
| 9999909          |
| 9999908.0000614  |
| 9999908          |
| 9999907.0000621  |
| 9999907          |
| 9999906.0000628  |
| 9999906          |
| 9999905.0000635  |
| 9999905          |
| 9999904.0000642  |
| 9999904          |
| 9999903.0000649  |
| 9999903          |
| 9999902.0000656  |
| 9999902          |
| 9999901.0000663  |
| 9999901          |
| 9999900.0000670  |
| 9999900          |

Vt ex sinu toto aucto septem cyphris (maioris accuratationis gratia) sic 10000000.0000000 aufer 10000000, sient 9999999.0000000: ex quibus autem 9999999, sient 9999998.0000001; & sic prosequaris vt a latere, donec centum creaueris proportionalia, quorum vltimum (si recte computaueris) erit 9999900.0004950.

17. *Tabula secunda progreditur a sinu toto sex cyphris aucto, per quinquaginta numeros alios deficientes proportionaliter, ea proportionem qua facillima est, & quam proxima proportioni, quae est inter primum & vltimum prima Tabula.*



# 10 MIRIFICI LOGARITHM.

Secunda Tabula.

10000000. 0000000  
100. 000000  
9999900. 000000  
99. 999000  
9999800. 001000  
99. 998000  
9999700. 003000  
99. 997000  
9999600. 006000

&c. usque ad

9995001. 222927

18. Tertia Tabula sexaginta novem columnis constat, & in qualibet columna ponuntur numeri viginti & unus, progredientes ea proportionem quae facillima est, & quam proxima illi proportioni quae est inter primum & ultimum secunda Tabula.

Unde huius prima columna facillime habetur à sinu toto quinque cyphris aucto, & à ceteris inde oris suam 2000<sup>am</sup> partem auferendo. Prima Columna tertia Tabula.

10000000. 000000  
5000. 0000  
9995000. 000000  
4997. 50000  
9990002. 50000  
4995. 00125  
9985007. 49875  
4992. 50374  
9980014. 99501  
&c. usque ad  
9900473. 57808

Vt primae Tabulae primum & ultimum sunt 10000000.0000000, & 9999900.0004950; in quorum proportionem, difficile est constituere quinquaginta proportionales numeros. Proxima itaque facilis proportio, est 100000 ad 99999; quae continuatur satis exactè adiciendo sinui toti sex cyphras, & auferendo ab antecedente suam partem 100000<sup>am</sup>, ut fiat subsequens, ut à latere vides; & haec Tabula praeter primum qui est sinus totus, etiam quinquaginta contineat proportionales numeros, quorum ultimum (ni erraveris) reperies esse 9995001.

222927.

Vt quia inter 10000000: 000000 primum secundae tabulae, & 9995001. 222927 eiusdem ultimum, proportio difficilis est progressionis; idè in proportionem facili 10000 ad 9995 (quae illi propinqua satis est) constituendi sunt numeri viginti & unus; quorum ultimus (ni erraveris) erit 9900473. 57808 A quibus iam creatis, reici potest ultima singulorum figura absque sensibili errore, quò facilius ab iis alijs postea creentur.

Primi

# CANONIS CONSTRUCTIO. 11

19. Primi numeri omnium columnarum, progrediuntur à sinu toto quatuor cyphris aucto, ea proportionem facillimam & proximam proportioni, quae est inter primum & ultimum primae columnae.

Vt primae columnae primus & ultimus sunt 10000000.0000, & 9900473. 5780: his proportio facillima maximè propinqua est 100 ad 99. A sinu igitur toto continuandi sunt 68 numeri in ratione 100 ad 99, auferendo à quolibet eorum suam centesimam partem.

20. Eadem proportionem, à prima columna numero secundo, per omnium columnarum secundos: & à tertio, per tertios: & à quarto, per quartos: & à ceteris respectivè, per ceteros fit progressio.

Vt ex antecedentis columnae numero aliquo fit numerus eiusdem ordinis in sequenti columna, subtrahendo suam centesimam partem, numerosque hoc qui sequitur ordine constituendo.

## PROPORTIONALIA TERTIAE TABULAE.

| Prima Columna. | Secunda Col.  |
|----------------|---------------|
| 10000000. 0000 | 9900000. 0000 |
| 9995000. 0000  | 9865050. 0000 |
| 9990002. 5000  | 9890102. 4750 |
| 9985007. 4987  | 9885157. 4237 |
| 9980014. 9950  | 9880214. 8451 |
| &c. usque ad   | &c. descen-   |
| 9900473. 5780  | 9801468. 8423 |

| Tertia Col.   | Inde 4 <sup>a</sup> . 5 <sup>a</sup> . &c. usque ad 69 <sup>am</sup> column. |
|---------------|------------------------------------------------------------------------------|
| 9801000. 0000 | &c. usque ad 5048858. 8900                                                   |
| 9796099. 5000 | &c. usque ad 5046334. 4605                                                   |
| 9791201. 4503 | &c. usque ad 5043811. 2932                                                   |
| 9786305. 8495 | &c. usque ad 5041289. 3879                                                   |
| 9781412. 6967 | &c. usque ad 5038768. 7435                                                   |
| &c. usque ad  | &c. usque ad                                                                 |
| 9703454. 1539 | usque tandem ad 4998609 4034                                                 |

B 2



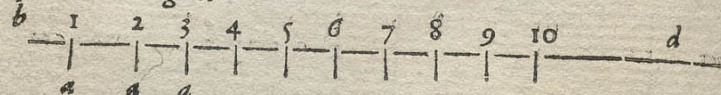
## 12 MIRIFICI LOGARITHM.

21. In tertia ergo Tabula, habes inter sinum totum, & medium sinus totius, interiectos sexaginta octo numeros in proportionem ut 100 ad 99; & rursus inter singulos binos horum, interiectos viginti numeros in proportionem ut 10000 ad 9999; & rursus inter binos primos horum, scilicet inter 10000000 & 9999000, habes in secunda Tabula interiectos 50 numeros; in proportionem ut 1000000 ad 999999; & tandem inter binos primos horum, habes in prima Tabula interiectos centum numeros, in proportionem ut 100000000 sinus totius ad 99999999; quorum differentia quum sit tantum unitatis, non est opus eam (interiectis mediis) minutius parti. Unde hæ tres tabule (postquam completa fuerint) ad tabulam artificialem commutandam sufficient.

Fluctusque sinus seu numeros naturales proportionem geometricam progredientes tabulis facillime inferere docuimus.

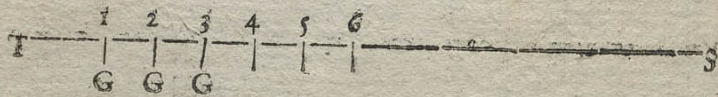
22. Superest Tabula saltem tertia, apud sinus sine numeros naturales geometricè decrecentes; suosque numeros artificiales Arithmeticè crescentes inferere.

23. Arithmeticè crescere, est equalibus temporibus equali semper quantitate augeri.



Ut ex puncto  $b$  fixo versus  $d$ , infinite producat lineam: in qua, ex  $b$  versus  $d$  procedat punctus  $a$ , mouens ea lege, ut equalibus temporis momentis equalibus feratur spatium: quæ sint  $b\ 1, 1\ 2, 2\ 3, 3\ 4, 4\ 5$ , &c. Dico hoc incrementum per  $b\ 1, b\ 2, b\ 3, b\ 4, b\ 5$ , &c. Arithmeticum dici. In numeris autem sint  $b\ 1, 10: b\ 2, 20: b\ 3, 30: b\ 4, 40: b\ 5, 50$ . Dico  $10, 20, 30, 40, 50$ , &c. Arithmeticè crescere: quia equalibus momentis, equali numero denarij semper augeri intelliguntur.

24. Geometricè decretere, est equalibus temporibus quantitatem primo totam, inde aliam atque aliam eius partem superfluentem, simili semper proportionali parte diminui.



Vt

## CANONIS CONSTRUCTIO. 13

Vt sit linea sinu totius  $TS$ , in hac moveatur punctus  $G$ , à  $T$  in  $1$  versus  $S$ , quantoque tempore deferatur à  $T$  in  $1$ , quæ sit (exempli gratia) decima pars  $T$  Sitatito idem  $G$  tempore moueatur ab  $1$  in  $2$ , quæ sit decima pars  $1\ S$ ; & à  $2$  in  $3$ , quæ sit decima pars  $2\ S$ ; & à  $3$  in  $4$ , quæ sit decima pars  $3\ S$ , & sic de cæteris. Dico hos sinus  $T\ S, 1\ S, 2\ S, 3\ S, 4\ S$ , &c. dici Geometricè decretere: quia inæqualibus spatiis proportionem similibus & tempore æqualibus diminuuntur. In numeris sit  $T\ S, 1\ 0000000: 1\ S, 9000000: 2\ S, 8\ 100000: 3\ S, 7290000: 4\ S$ , sit  $6561000$ , &c. Dico hos sinuum numeros, æqualibus temporibus simili proportionem diminutos, dici Geometricè decretere.

35. Unde punctus mobilis Geometricè ad fixum accedens, velocitates suas prout distantias, à fixo proportionatas habet.

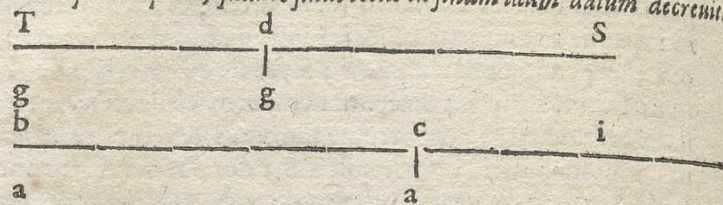
Vt repetito præcedenti Schemate, dico quum mobilis punctus geometricus  $G$  est in  $T$ , eius velocitas est ut distantia  $TS$ : & quum  $G$  est in  $1$ , eius velocitas est ut  $1\ S$ : & quum in  $2$ , eius velocitas est ut  $2\ S$ , & sic de cæteris. Atque ita quæ est proportio distantiarum  $T\ S, 1\ S, 2\ S, 3\ S, 4\ S$ , &c. ad inuicem, eadem etiam erit proportio velocitatum  $G$  in punctis  $T, 1, 2, 3, 4$ , &c. ad inuicem. Nam magis minusve velox punctus arguitur, prout magis minusve longè sub æqualibus temporibus ferri conspicitur. Qualis itaque processus ratio, talem etiam & velocitatum esse necesse est: at talis est sub æqualibus temporibus ratio processuum  $T\ 1, 1\ 2, 2\ 3, 3\ 4, 4\ 5$ , &c. qualis distantiarum  $T\ S, 1\ S, 2\ S, 3\ S, 4\ S$ , &c. ut mox docebimus. Unde necessariò qualis habitudo distantiarum  $G$  ab  $S$ , videlicet  $T\ S, 1\ S, 2\ S, 3\ S, 4\ S$ , &c. inuicem; talis etiam est velocitatum  $G$  in punctis  $T, 1, 2, 3, 4$ , &c. quod erat demonstrandum. At quòd processuum  $T\ 1, 1\ 2, 2\ 3, 3\ 4, 4\ 5$ , &c. talis sit ratio, qualis distantiarum  $T\ S, 1\ S, 2\ S, 3\ S, 4\ S$ , &c. pater: quia quantitatum proportionaliter continuatarum differentie etiam in eadem proportionem continuantur. At hæ distantie (per hypothesin) proportionaliter continuantur, & illi processus sunt harum differentie: quare eadem processus quæ distantias ratione continuari certum est.

B 3



# 14 MIRIFICI LOGARITHM.

26. † Numerus artificialis sinus, dati est qui Arithmetice crevit tantum  
semper velocitate, quanta sinus totus incepit Geometricè decrescere,  
tantoque tempore, quanto sinus totus in sinum illum datum decreuit.

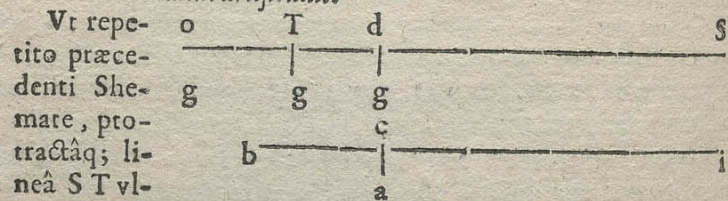


Sit sinus totus linea T S, sinus datus in eadem linea d S: certis  
quibusdam momentis moveatur g Geometricè à T in d. Sitque  
alia linea b i versus i infinita, in qua ex b moveatur a Arithme-  
ticè, eadem velocitate quâ g primò cum erat in T: totidemque  
temporis momentis procedat a ex b fixo versus i usque in c pun-  
ctum: dicetur numerus metiens b c lineam numerus artifi-  
cialis sinus d S dati.

Vnde sinus totius nihil est pro artificiali.

Nam ex Schemate, cum g est in T faciens suam distantiam  
ab S sinum totum, punctus Arithmeticus a incipiens in b, nul-  
quam inde processit. Vnde ex definitione distantie, sinus totius  
nullus erit artificialis.

Hinc etiam sequitur, quod cuiuslibet dati sinus numerus artifi-  
cialis, maior est differentia inter sinum totum, & sinum datum: & minor  
differentia qua est inter sinum totum, & quantitatem eo maiorem in  
eadem ratione, qua est sinus totius ad datum. Atque ha differentia di-  
cuntur ideo termini artificialis.



Vt repe-  
tito præce-  
denti Sche-  
mate, pro-  
tractâq; li-  
neâ S T vl-  
tra T in o, Ita ut S o se habeat ad T S. ut T S ad d S. Dico sinus d  
S numerum artificialem b c, maiorem esse quàm T d, & mino-  
rem quàm o T. Quanto enim tempore g ab o in T fertur, tanto  
& g à T in d feretur (per 24) quia o T est tanta pars o S, quanta  
T d est lineæ T S, tantoque tempore (per definitionē artificialis  
feretur)

## CANONIS CONSTRUCTIO. 15

feretur & a à b in c: ita ut o T, T d, & b c sint æqualium tempo-  
rum processus. At quia g inter T & o mouens, velocior est  
quàm in T, & inter T, & d tardior, in T autem g æqui velox  
est atque a (per 26. Sequetur processum o T quem g iam  
velox facit, maiorem esse: & T d processum quem g tardus  
facit, minorem esse: & b c processum (quem punctus a me-  
diocri suo motu totidem etiam temporis momentis perficit)  
medium quoddam esse inter vtrumque, quod erat demonst-  
randum. Numeri itaque artificialis quem b c designat, dicitur o  
T terminus maior, & T d terminus minor.

29. Dati itaque sinus artificiales terminos exhibere.

Ex præmissa probatur minorem terminum relinquere, ablato  
sinu dato à sinu toto; & maiorem terminum produci, multi-  
plicato sinu toto in terminum minorem, & producto diuiso  
per sinum datum, vt sequenti exemplo.

30. Vnde prima Tabula primum proportionale, quod est 9999999,  
habet suum artificialem numerum inter terminos 1.0000001, &  
1.0000000.

Nam per præmissam aufer 9999999 à sinu toto cyphris aucto  
fiet unitas cum suis cyphris pro minore termino: hanc unitatem  
cyphris auctam, & multiplicatam in sinum totum, diuide per  
9999999, & fiet 1.0000001; siue (si maiorem accuratorem  
requiris) 1.00000010000001 pro maiore termino.

31. Insensibili differentia distantes termini ipsi, siue inter eos quiduis  
pro numero artificiali vero habetur.

Vt in superiori exemplo, sinus hujus 9999999. artificialis  
numerus habetur hic 1.0000000, siue hic 1.00000010, siue  
omnium optimè hic 1.0000005: quia enim ipsi termini  
1.0000001 & 1.0000000, insensibili fractione vtpote  $\frac{1}{10000000}$   
differunt ab inuicem: ideo & ipsi, & quicquid inter eos est,  
multò minùs, multòque insensibiliore errore, à vero different  
artificiali inter hos terminos constituto.

32. Quicunque sinum Geometrica proportionē à sinu toto deficien-  
tium, omnis artificiali numero aut terminis datis, ceterorum etiam  
dare.

Consequitur hoc necessariò incrementi Arithmetici, decre-  
menti



## 16 MIRIFICI LOGARITHM.

menti Geometrici, & numeri artificialis definitiones: siquidem per illas, ut sinus Geometrica proportionem decrescunt continuo: ita interim sui artificiales, continuo Arithmetico progressu per æqualia accrescunt. Vnde cuilibet sinui Geometricæ progressionis decrescendo, respondet suus artificialis Arithmeticae progressionis crescendo: primo scilicet primus, & secundo secundus, & sic deinceps.

Ita ut si primus artificialis, respondens primo sinui post sinum totum datur, secundus artificialis erit eius duplum, tertius triplum, & sic de cæteris: donec omnes omnium artificiales innotescant, ut sequenti exemplo patebit.

33. *Hinc omnium sinuum proportionalium prima Tabula, numeri artificiales inter terminos propinquos includi, & per consequens ex illis suis dari possunt.*

Ut cum sinus totius artificialis sit 0 (per 27) & primi post sinum totum, qui est 999999 in prima Tabula, artificialis sit (per 30) inter terminos 1.0000001. & 1.0000000: necessarium secundi post sinum totum, qui est 999998.0000001, artificialis continebitur inter dupla illorum terminorum: scilicet inter 2.0000002 & 2.0000000: & tertij 999997.0000003, inter eorundem tripla: scilicet inter 3.0000003 & 3.0000000. Et sic in cæteris, æqualiter semper augendo terminos intervallo primorum terminorum: donec omnium proportionalium primæ Tabulæ artificiales terminos compleueris. Poteris con simili progressu, si liber, numeros ipsos artificiales exiguo & insensibili errore continuare hoc ordine: pro sinus totius artificiali, erit 0; pro primi post sinum totum artificiali, erit 1.00000005 (per 31); pro secundi, 2.00000010: pro tertij, 3.00000015. Et ita deinceps.

34. *Differentia artificialium sinus totius & sinus dati, est ipse sinus dati artificialis.*

Patet hoc quum enim sinus totius artificialis sit nihil per 27, hoc nihilo ex artificiali dati subducto, ipsum integrum artificialem dati remanere necesse est.

35. *Quorum artificialium differentia, addenda est ad artificialem maioris sinus eorundem, ut habeas artificialem minoris: & subtrahenda ab artificiali minoris sinus, ut habeas artificialem maioris.*

Neces-

## CANONIS CONSTRUCTIO. 17

Necessarium hoc sit, siquidem crescunt artificiales decrescentibus sinibus, atque minor est artificialis maioris sinus, & maior minoris. Ideoque æquum est differentiam addere minori artificiali, ut habeas artificialem maiorem licet minoris sinus: & contrà, auferre differentiam à maiore artificiali, ut habeas minorem artificialem licet maioris sinus.

36. *Similiter proportionatorum sinuum sunt æqui-differentes artificiales.*

Consequitur hoc necessarium definitiones artificialium & motuum: Nam cum per eas, Geometrico decremento similiter proportionato, respondet Arithmeticum incrementum æquale semper: necessarium similiter proportionatis sinibus, respondere æqui-differentes artificiales & numeros, & numerorum terminos concludimus. Ut in superiori exemplo primæ Tabulæ, quia similis est proportio inter primum proportionale post sinum totum 999999.0000000, & tertium 999997.0000003: ei quæ est inter quartum 999996.0000006, & sextum 999994.0000015. Idem numerus artificialis iste 1.00000005 primi, differt ab artificiali isto 3.00000015 tertij, eadem differentia, quæ artificialis iste 4.00000020 quarti, differt ab artificiali isto 6.00000030 sexti proportionalis. Eadem etiam est æqualitatis ratio inter differentias terminorum artificialium adiungentem: videlicet tam minorum inter se, quàm etiam maiorum inter se, quorum sinus sunt similiter proportionati.

37. *Ut trium sinuum in proportionem Geometricam continuatorum, quadratum medij æquatur facto ex ductis inuicem extremis: ita in suis artificialibus numeris, duplum medij æquatur aggregato extremorum. Vnde horum artificialium duobus quibuscunque datum, tertius innotescit.*

Quia horum trium sinuum, ratio quæ est inter primum & secundum, similis est rationi quæ est inter secundum & tertium: Idem (per præmissam) suorum artificialium ea est differentia inter primum & secundum, quæ est inter secundum & tertium. Sit (verbi gratia) primus artificialis linea b c expressus, secundus linea b d, tertius linea b e: sitque vasa linea b c d e comprehensum hoc modo





b                      c      d      e                      f

---

sint que differentia  $c d$  &  $d e$  æquales; horum medium  $b d$  dupletur, producta linea hæc à  $b$  ultra  $e$  in  $f$ , ita ut  $b f$  sit duplum  $b d$ . Dico  $b f$  æquari utrisque lineis,  $b c$  primi artificialis, &  $b e$  tertij; ab æqualibus enim  $b d$  &  $d f$ , aufer æqualia  $c d$  &  $d e$ : scilicet  $c d$ , à  $b d$ , &  $d e$ , à  $d f$ : & remanebunt  $b c$  &  $e f$  necessariò æqualia. Cum itaque tota  $b f$ , æqualis sit utrisque  $b c$  &  $e f$ : ergo & utrisque  $b e$  &  $b c$  æquabitur, quod erat demonstrandum. Vnde sequitur canon: si trium horum artificialium medium datum duplexeris, & hinc subtraxeris extremum datum, reliquum extremorum quæsitum innouescet: & si extrema data conjunxeris, & aggregatum hoc bipartiuersis, medium fiet notum.

38. Quatuor Geometricè proportionalium, sicut factum ex ductu mediorum, æquatur facta ex ductu extremorum: Ita suorum artificialium, aggregatum mediorum æquatur aggregato extremorum. Vnde horum artificialium tribus quibuscunque datis, quorum innouescit.

Quia horum quatuor proportionalium, ratio quæ est inter primum & secundum, similis est rationi quæ est inter tertium & quartum: Idèd (per penultimè præmissam) suorum artificialium, ea est differentia inter primum & secundum, quæ est inter tertium & quartum. Tales itaque quantitates in linea  $b f$  suprascripta sumantur, ut hic, quartum  $b a$  primum artificiale,  $b c$  secundum,  $b e$  tertium, &  $b g$  quartum referat, factis differentiis.

b                      a      c      d      e      g                      f

---

$a c$  &  $e g$  æqualibus: Ita ut  $d$  in medio  $c e$  positum, in medio  $a g$  etiam poni necesse est. Iam dico aggregatum  $b c$  secundi, &  $b e$  tertij, æquari aggregato  $b a$  primi, &  $b g$  quarti. Nam quia (per præmissam) duplum  $b d$ , quod est  $b f$ , æquatur utrique  $b c$  &  $b e$ : quia differentia eorum à  $b d$ , videlicet  $c d$  &  $d e$  sunt æquales. Eadem ratione, & idem  $b f$  æquabitur utrisque  $b a$  &  $b g$ : quia eorundem differentia à  $b d$ , videlicet  $a d$  &  $d g$  sunt etiam æquales.

Quum

Quum itaque & aggregatum ex  $b a$  &  $b g$ , & aggregatum ex  $b c$  &  $b e$ , sint iidem duplo  $b d$ , quod est  $b f$  æqualia: ergo & inter se æquabuntur, quod erat demonstrandum. Vnde sequitur canon, si quatuor horum artificialium, ab aggregato extremorum datorum, subduxeris alterum mediorum cognitum, relinquetur reliquum medium quod quærebatur: & si ab aggregato mediorum cognitorum subduxeris alterum extremorum cognitum, relinquetur extremum quæsitum.

39. Duorum artificialium differentia, est inter duos terminos, ad quorum maiorem se habet sinus totus, ut eorum artificialium minor sinus ad sinum differentiam: & ad minorem terminum se habet sinus totus, ut artificialium sinus maior ad sinum differentiam.

V                      T                      c                      d      e                      S

---

Sit sinus totus  $T S$ , sinus duo dati  $d S$  major, &  $e S$  minor: Ultra  $S T$  signetur puncto  $V$  distantia  $T V$ , ea lege, ut  $S T$  se habeat ad  $T V$ , ut  $e S$  minor sinus, ad  $d e$  differentiam sinuum. Deinde extra  $T$  versus  $S$ , signetur puncto  $c$  distantia  $T c$  ea lege, ut  $T S$  se habeat ad  $T c$ , ut  $d S$  sinus maior, ad  $d e$  differentiam sinuum. Dico differentiam artificialium respondentium sinibus  $d S$  &  $e S$ , constitui inter terminos  $V T$  maiorem, &  $T c$  minorem. Nam quia ex hypothesi, ut  $e S$  ad  $d e$ , ita  $T S$  ad  $T V$ ; & ut  $d S$  ad  $d e$ , ita  $T S$  ad  $T c$  se habent: idèd etiam ex natura (proportionalium) sequuntur duæ conclusiones: Primò, quod  $V S$  se habet ad  $T S$ , ut idem  $T$ , ad  $c S$ . Secundò, quod similis est ratio  $T S$  ad  $c S$ , rationi quæ est  $d S$  ad  $e S$ . Et propterea (per 36) differentia artificialium respondentium sinibus  $d S$  &  $e S$ , æqualis est differentia artificialium respondentium sinui toto  $T S$ , & sinui  $c S$ . At hæc differentia (per 34) est artificialis ipsius sinus  $c S$ : & hic artificialis inter terminos  $V T$  maiorem, &  $T c$  minorem (per 28 pos.) includitur: quia per primam conclusionem jam dictam,  $V S$  maior sinui toto se habet ad sinum totum  $T S$ , ut idem  $T S$  ad  $c S$ . Vnde necessariò differentia artificialium respondentium sinibus  $d S$  &  $e S$ , constituitur inter terminos  $V T$  maiorem, &  $T c$  minorem, quod erat demonstrandum.



20 MIRIFICI LOGARITHM.

40. *Terminos differentia inter artificiales numeros duorum datorum sinuum exhibere.*

Quum per præmissam, sinus minor se habeat ad differentiam sinuum, ut sinus totus ad maiorem terminum differentia artificialium: & sinus maior se habeat ad differentiam sinuum, ut sinus totus ad minorem terminum: sequetur ex natura proportionalium, quod ducto sinu toto per differentiam datorum sinuum, oriatur ex producto diuiso per minorem datorum, maior terminus: & ex producto diuiso per maiorem sinuum, oriatur minor terminus.

EXEMPLVM.

**V**T sit sinuum datorum maior 999975. 5000000, minor autem 999975. 0000300: quorum differentia. 4999700 ducta in sinum totum (adiectis prius octo cyphris utrique post punctum demonstrationis gratia, licet alioquin septem sufficiant) quod hinc producit, si per maiorem sinum, scilicet per 999975. 5000000 diuiseris, prouenient. 4999712 octo figurarum post punctum pro minore termino. Sin quod producit, per minorem sinum, scilicet per 999975. 0000300 diuiseris, prouenient. 49997124 pro maiore termino: inter quos (ut demonstratum est) constituitur differentia artificialium sinuum datorum. Sed quia protractio huius fractionis in octauam figuram ultra punctum, est accuratio plusquam requisita, præsertim cum in ipsis sinibus septem tantum ponantur figurae post punctum: idè delecta octaua illa siue vltima vtriusque termini figurae uterque terminus una cum ipsa artificialium differentia, in fractione. 4999712 stabiliri potest, absque vel minimo scrupulo sensibilis erroris.

41. *Sinuum vel numerorum naturalium, non in ipsos proportionales primæ Tabulae, sed prope vel inter eos cadentium: numeros artificiales, eorumve saltem terminos insensibili differentia distantes exhibere.*

Sinui dato sinum primæ Tabulae proximum, siue minorem siue maiorem nota: huius tabulati sinus terminos artificiales (per 33) quære, & inuentos referua: deinde (per præmissam) terminos differentia inter artificiales numeros sinus

dati

CANONIS CONSTRUCTIO. 21

dati & sinus tabulati, siue ambos, siue (quia ferè æquales sunt, ut superiori exemplo patet) eorum alterutrum quære. Hos iam inuentos, horumve alterutrum adde ad illos nuper referuatos terminos, aut ab illis substrahe (per 8. 10 & 35: prout sinus datus fuerit minor aut maior tabulato ei proximo: & qui hinc producuntur numeri, erunt termini propinqui inter quos includetur artificialis numerus sinus dati.

EXEMPLVM.

**V**T sit sinus datus 999975. 5000000, cui sinus in Tabula proximus, est 999975. 0000300 minor dato: huius termini artificiales (per 33) sunt 25. 00000025 & 25. 0000000: deinde (per præmissam) differentia inter artificiales numeros sinuum dati & tabulati, est. 4999712: quam (per 35) aufer ab illis terminis, quia sunt termini minoris sinus: & prouenient 24. 5000313 & 24. 5000288, termini quæsi sinus dati 999975. 5000000: cuius ipse artificialis numerus in quouis terminorum, siue optimè in 24. 5000300 (per 31) constitui potest absque sensibili errore.

ALIUD EXEMPLVM.

**S**I sinus datus 9999900. 0000000, sinus tabulatus ei proximus 9999900. 0004950, huius termini artificiales sunt 100.0000100 & 100.0000000 (per 33: ) Deinde differentia inter artificiales numeros illorum sinuum, erit (per præmissam). 0004950, quam (per 35) ad superiores terminos adde, & sient 100.0005050 pro maiore termino, & 100.0004950 pro minore termino, inter quos artificialis quæsi sinus dati includitur.

42. *Hinc sequitur, omnium proportionalium secunda Tabula numeros artificiales exactè satis dari: seu inter terminos cognitos insensibili fractione differentes includi posse.*

Ut in præcedenti exemplo, quum numerus artificialis huius sinus 9999900 (qui est primum proportionale secundæ Tabulae) demonstratur inter terminos hos 100.0005050 & 100.0004950 esse: necessariò secundi proportionalis, numerus artificialis (per 32) erit inter hos terminos 100.0010100 & 200.0009900: & terrij proportionalis, inter hos terminos 300.0015150 & 300.0014850, &c. Et tandem

C 3



## 22 MIRIFICI LOGARITHM.

ultimi sinus secundæ Tabulæ, qui est 9995001. 222927, artificialis numerus includetur inter terminos hos 5000. 0252500 & 5000. 0247500. Quibus iam habitis terminis (per 31) poteris ipsos artificiales numeros eorum exquirere.

43. *Sinum vel numerorum naturalium non in ipsos proportionales secundæ Tabulæ, sed prope vel inter eos cadentium, numeros artificiales exhibere: seu inter terminos cognitos insensibili fractione differentes includere.*

Sinui dato sinum secundæ Tabulæ proximum, siue maiorem siue minorem nota, huius tabulati sinus terminos artificiales per præmissam quære: deinde per regulam proportionis, quære quantum proportionale se habens ad sinum totum: ut sinuum dati & tabulati minor se habet ad maiorem. Quod vno modo perfici poterit, ducendo dati & tabulati minorem in sinum totum, & productum in maiorem diuidendo. Altero modo faciliore, ducendo sinuum dati & tabulati differentiam in sinum totum, & productum in dati & tabulati maiorem diuidendo, atque quotientem ex sinu toto auferendo. At quia huius quarti proportionalis, numerus artificialis (per 36) tantum differt ab artificiali sinus totius, quantum inuicem artificiales sinuum dati & tabulati differunt: Et quia etiam illorum differentia, eadem est cum ipso artificiali quarti per 34: Ideo artificiales terminos quarti, per penultimè præmissam è Tabula prima quære, & inuentos adde ad artificiales terminos tabulati, aut ab illis subtrahere per 8. 10. & 35. prout tabulatus sinus fuerit maior aut minor dato, & producentur artificiales termini sinus dati.

### EXEMPLVM.

VT sit sinus datus 9995000. 000000, sinus Tabulæ secundæ ei proximus est 9995001. 222927, huius termini artificiales (per præmissam) sunt 5000. 0252500 & 5000. 0247500. Quantum deinde proportionale alterutro modorum suprascriptorum quære, & fiet 9999998. 7764614, cuius terminos artificiales (per 41) è prima Tabula quære, eruntque 1. 2235388 & 1. 2235386: quos ad superiores terminos per 8 & 35 adde, fientque pro terminis artificialibus dati 5001. 2487888 & 5001. 2482886. Vnde & numerus inter hos

## CANONIS CONSTRUCTIO. 23

hos medius, qui est 5001. 2485387, optimè (per 31 pos.) pro ipso artificiali numero sinus 9995000 dati statuitur absque sensibili errore.

44. *Hinc sequitur, omnium proportionalium primæ Columnæ tertiæ Tabulæ, numeros artificiales exacte satis dari: seu inter terminos cognitos insensibili fractione differentes includi posse.*

Nam quum per præmissam, huius 9995000 (qui est primus sinus infra sinum totum, ex proportionalibus primæ Columnæ tertiæ Tabulæ) numerus artificialis sit 5001. 2485387 absque errore sensibili: secundi proportionalis scilicet 9990002. 5000, numerus artificialis (per 32) erit 10002. 4970774. Et sic in cæteris, progrediendo vsque ad ultimum eius columnæ sinum 9900473. 57808. cuius, pari ratione artificialis numerus erit 100024. 9707740: cuiusque termini 100024. 9657720 & 100024. 9757760 erunt.

45. *Numerorum naturalium, seu sinuum non in ipsos proportionales primæ Columnæ tertiæ Tabulæ, sed prope vel inter eos cadentium, numeros artificiales exhibere: seu inter cognitos terminos insensibili fractione differentes includere.*

Sinui dato sinum primæ Columnæ tertiæ Tabulæ proximum, siue minorem siue maiorem nota; huius tabulati terminos artificiales per præmissam quære: deinde quantum proportionale se habens ad sinum totum, ut sinuum dati & tabulati minor ad maiorem, per vnum ex modis in penultimè præcedente descriptis quære: huius quarti ita inuenti terminos artificiales (per penultimè præmissam) è secundæ Tabulæ quære, & inuentos adde ad terminos tabulati sinus superius inuentos, aut ab illis subtrahere (per 8. 10. & 35.) & producentur artificiales termini sinus dati.

### EXEMPLVM.

VT sit sinus datus 9900000, proportionalis sinus primæ Columnæ tertiæ Tabulæ ei proximus, est 9900473. 57808, cuius termini artificiales per præmissam sunt 100024. 9657720 & 100024. 9757760. Quantum inde proportionale erit 9999521. 6611850, cuius termini artificiales (per 43 è secundæ Tabulæ delumpti) sunt 478. 3502290 & 478. 3502812: quibus terminis ad terminos superiores tabulati (per



# 24 MIRIFICI LOGARITHM.

(per 8 & 35) additis, prouenient termini 100503.3260572 & 100503.3160010, inter quos necessariò cadit artificialis numerus quæsitus. Vnde numerus inter hos medius, qui est 100503.3210291, pro vero artificiali numero sinus 9900000 dati, statui absque sensibili errore potest.

46. *Hinc sequitur, omnium proportionalium tertia Tabula numeros artificiales exactè satis dari.*

Nam quum (per præmissam) 100503.3210291, sit artificialis primi sinus secundæ Columnæ, qui est 9900000, cæterique primi reliquarum columnarum sinus eadem proportionem progredientur, necessariò (per 32 & 36) eorum numeri artificiales eadem semper differentia crescunt, additis 100503.3210291 antecedenti artificiali, vt fiat sequens. Habitis ergo sic primis artificialibus cuiusque columnæ, atque per penultimè præcedentem omnibus artificialibus primæ columnæ datis, elige tibi, an mauis simul eiusdem columnæ omnes artificiales condere, addendo semper ad superiorem artificialem cuiuslibet columnæ, hanc artificialium differentiam 5001.2485387, vt fiat proximè inferior eiusdem columnæ artificialis: An mauis simul eiusdem ordinis omnes artificiales, scilicet omnes secundos singularum columnarum artificiales, inde omnes tertios, inde quartos, & sic reliquos constituere, addendo semper 100503.3210291 cuiuslibet artificiali præcedentis columnæ, vt eiusdem ordinis sequentis columnæ artificialis proueniat. Vtrius enim modo, omnes omnium huius Tabulæ proportionalium habentur artificiales, quorum ultimus, & ad sinum 4998609.4034 congruens, est 6934250.8007528.

47. *Omnibus tertiæ Tabulæ naturalibus numeris, ascribendi sunt sui artificiales, vt tertia Tabula integra fiat & perfecta: quam posthac semper radicalem vocabimus.*

Hæc huius Tabulæ conscriptio fit constituendo columnas numero & ordine quibus per 20 & 21 describuntur: & diuisa in duas series:

RADI-

# CANONIS CONSTRUCTIO. 25

## RADICALIS TABULÆ.

| Columna prima. |              | Columna secunda. |              |
|----------------|--------------|------------------|--------------|
| Naturales.     | Artificiales | Naturales.       | Artificiales |
| 20000000.0000  | 0            | 9900000.0000     | 100503.3     |
| 9995000.0000   | 5001.2       | 9895010.0000     | 101504.6     |
| 9990002.5000   | 10002.5      | 9890102.4750     | 110505.8     |
| 9985007.4987   | 15003.7      | 9885157.4237     | 115507.1     |
| 9980014.9950   | 20005.0      | 9880214.8451     | 120508.3     |
| 9900473.5780   | 100025.0     | 9801468.8423     | 200528.4     |
|                |              |                  |              |

| Columna 69.  |               |
|--------------|---------------|
| Naturales.   | Artificiales. |
| 5048858.8900 | 6834225.8     |
| 5046333.4605 | 6839227.1     |
| 5043811.2932 | 6844228.3     |
| 5041289.3879 | 6849229.6     |
| 3038768.7435 | 6854230.8     |
| 4998609.4034 | 6934250.8     |

quarum prima, proportionalia illa Geometrica, quæ sinus numerosque naturales nominamus: secunda, hqs suos artificiales Arithmeticè per æqualia progredientes

D



## 26 MIRIFICI LOGARITHM.

contineat. Duobus tamen (compendij, gratia) animaduertis. Primo quod illis omnibus artificialibus, vnâ post punctum relinqui figuram satis sit, cæteris sex nouissimis jam reiectis: quas tamen si initio neglexisses error inde frequenti multiplicatione priorum tabularum, accreuisset in hac tertia intollerabilis. Secundò, si secunda post punctum figura excedat quaternarium: figura prima, quæ sola post punctum relinquitur, est vnitatem augenda. Vt pro 10002. 48, &c. rectius est ponere 10002. 5, quàm 10002. 4: & pro 100035001, aptius ponimus 1000. 4, quàm 1000. 3. Itaque eo situ procedat jam radicalis Tabula quo præmittitur.

48. *Perfectam radicalis Tabula, ex ea sola Tabula artificialis numeros excerpimus.*

Vt enim priores duæ Tabulæ ad constitutionem tertiæ in inferiebant; Ita tertia hæc radicalis ad principalem artificialem Tabulam, quàm facillimè & absque errore sensibili condendam inferuit.

49. *Sinum maiorem quàm 999700, artificiales numeros facillime exhibere.*

Fiet hoc, sola subtractione sinus dati à sinu toto. Nam per 29, artificialis numerus sinus 9996709, est inter terminos 3300 & 3301; qui quidem termini (quia inuicem vnitatem tantum differunt) à suo artificiali vero, non possunt errore sensibili, videlicet maiorem vnitatem differre. Vnde ipse terminus minor 3300, qui sola subtractione habetur, pro ipso artificiali capi potest. Eadem necessario ratio est de omnibus sinibus hoc maioribus.

50. *Sinum omnium intra limites Tabula radicalis comprehensorum, artificiales exhibere.*

Sinum dati, & tabulati ei proximi, differentiam duc in sinum totum; productum partire per facillimum diuisorem, qui vel sit sinus datus, vel tabulatus ex proximis, vel inter vtrumque vtrumque constitutus; & produceretur differentia artificialium aut terminus maior, aut minor, aut intermedium quidpiam (per 39) quorum nullus à vera artificialium differentia errore sensibili differet, propter propinquitatem numerorum Tabulæ. Et ideo hunc eorum quemcunque productum

## CANONIS CONSTRUCTIO. 27

ductum (per 35) adde, ad artificialem tabulati in Tabula repperit, si sinus datus sit minor tabulato sinu: alioquin illum productum ex hoc tabulati artificiali subtrahere, & proueniet dati sinus numerus artificialis quæ sitis.

### EXEMPLVM.

Vt, sit sinus datus 7489557, cuius quæritur artificialis. Sinus tabulatus ei proximus est 7490786. 6119, hinc aufero illam adiectis cyphris sic 7489557.0000, relinquentur 1229 6119; quæ ducta in sinum totum, diuido per numerum facillimum, qui sit vel 7489557.0000, vel 7490786. 6119, vel optimè per quippiam inter eos constitutum, ut potest per 7490000, & facillima diuisione prouenient 16421. quæ (quia datus sinus minor est tabulato) adde ad artificialem tabulati, videlicet ad 2889111. 7, & fient 2890751. 8, quæ idem valent quod 2890751, sed quia Tabula principalis nec fractiones admittit, nec quicquam ultra punctum, ponimus pro illo 2890752, qui est artificialis quæsitus.

### ALIUD EXEMPLVM.

Sit sinus datus 7071068.0000, sinus tabulæ ei proximus erit 7070084.4434, quorum differentia est 9835663, quibus ductis in sinum totum, productum diuide optimè per 7071000, quæ sunt inter sinus datum & tabulatum, prouenient inde 1390. 9, quæ (quia sinus datus excedit tabulatum ei proximum) subtrahatur ex artificiali numero tabulati in tabula repperito, scilicet à 3467125. 4, remanebit 3465734. 5. Vnde 3465735 ponitur pro artificiali quæsitio sinus 7071068 dati. Itaque hæc libertas diuisorem eligendi miram parit facilitatem.

51. *Omnes sinus in proportionem duplicem habent 6931469 22 pro differentia suorum artificialium.*

Quia enim omnis sinus ad suum dimidium eadem est ratio, quæ est sinus totius ad 5000000: ideo (per 36) diffe-



# 28 MIRIFICI LOGARITHM.

rentia artificialium cuiusque sinus & sui dimidij, est eadem cum differentia artificialium sinus totius, & sui dimidij 5000000. At eadem est differentia artificialium sinus totius, & sinus 5000000, cum ipso artificiali sinus 5000000 (per 34) cuius 5000000, artificialis (per præmissam) erit 6931469.22. Ergo & idem numerus 6931469.22 erit differentia omnium artificialium, quorum sinus sunt in proportionem dupla: & per consequens duplum eius, scilicet 13862938.44, erit differentia omnium artificialium, quorum sinus sunt in ratione quadrupla: & triplum eius, videlicet 20794407.66, erit differentia omnium artificialium, quorum sinus sunt in ratione octupla.

52. Omnes sinus in proportionem decupla, habent 23025842.34 pro differentia suorum artificialium.

Nam per penultimæ præmissam, sinus 8000000 habet artificialem suum 2231434.68: & per præmissam, differentia inter artificiales sinuum 8000000, & suæ octauæ partis 1000000, est 20794407.66: Vnde per additionem sunt 23025842.34, pro artificiali sinus 1000000: & quum ad hunc sinus totus sit decuplus, omnes sinus in rationem decupla, eandem illam differentiam 23025842.34, inter suos artificiales habebunt, eadem causâ & ratione, quam iam in dupla proportionem per præcedentem exposuimus, quod probandum erat. Et per consequens, centuplæ proportioni respondebit huius artificialis duplum, quod est 46051684.68, pro differentia artificialium: Et eiusdem triplum, quod est 69077527.02, erit differentia omnium artificialium, quorum sinus sunt in rationem millecupla. Et sic de ratione 10000<sup>a</sup>, & aliis, ut infra.

53. Vnde omnes sinus in ratione composita ex duplo & decuplo, habent artificiales suos differentia 6931469.22, & differentia 23025842.34 respectu differentes.

Ut in tabella subsequenti conspicerè licet.

Sinuum

# CANONIS CONSTRUCTIO. 29

| Sinuum<br>proportio-<br>nes datæ. | Artificialium<br>respondentes<br>differentiæ. | Sinuum<br>proportio-<br>nes datæ. | Artificialium<br>respondentes<br>differentiæ. |
|-----------------------------------|-----------------------------------------------|-----------------------------------|-----------------------------------------------|
| Dupla                             | 6931469.22                                    | 8000pla                           | 89871934.68                                   |
| Quadrupla                         | 13862938.44                                   | 10000pla                          | 92103369.36                                   |
| Octupla                           | 20794407.66                                   | 20000pla                          | 99034838.58                                   |
| Decupla                           | 23025842.34                                   | 40000pla                          | 105966307.80                                  |
| 20cupla                           | 29957311.56                                   | 80000pla                          | 112897777.02                                  |
| 40cupla                           | 36888780.78                                   | 100000pla                         | 115129211.70                                  |
| 80cupla                           | 43820250.00                                   | 200000pla                         | 122060680.92                                  |
| Centupla                          | 46051684.68                                   | 400000pla                         | 128992150.14                                  |
| 200pla                            | 52983153.90                                   | 800000pla                         | 135923659.36                                  |
| 400pla                            | 59914623.12                                   | 1000000pla                        | 138155054.04                                  |
| 800pla                            | 66846092.34                                   | 2000000pla                        | 145086523.26                                  |
| Millecupla                        | 69077527.02                                   | 4000000pla                        | 152017992.48                                  |
| 2000pla                           | 76008996.24                                   | 8000000pla                        | 158949461.70                                  |
| 4000pla                           | 82940465.46                                   | 10000000pla                       | 161180896.38                                  |

54. Omnium sinuum ultra limites radicalis Tabula exclusorum, numeros artificiales inuestigare.

Hoc faciliè fit, sinum datum multiplicando per 2, 4, 8, 10, 20, 40, 80, 100, 200: vel per alium quemvis proportionis numerum hac tabella expressum, donec producat numerus, qui intra limites radicalis tabulæ contineatur. Huius iam sub Tabula comprehensi artificialem (per 50) quære, cui acquisito adde tandem differentiam artificialem, quam Tabella indicat priori convenisse multiplicationi.

## EXEMPLVM.

Quæritur, quem artificialem sinus 378064 habeat, is cum ultra limites Tabulæ radicalis excludatur, per numerum aliquem proportionum præcedentis tabellæ, videlicet per D 3



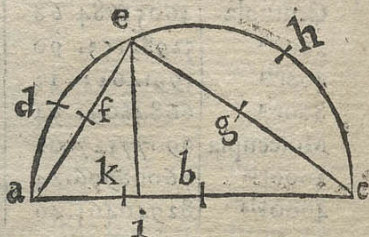
# 36 MIRIFICI LOGARITHM.

20 ducatur, fietque 7561280, cuius iam intra Tabulam ca-  
dentis artificialem (per 50) quære, fietque 2796444. 9. ad  
quem adde differentiam in Tabella inuentam conuenien-  
tem vigecuplæ proportioni, quæ est 29957311. 56, fietque  
32752756. 4. Vnde 32752756 est artificialis quæsitus, sinus  
378064 dati.

55. *Ut dimidium sinus totius, se habet ad sinum dimidij alicuius  
arcus; ita sinus complementi eiusdem dimidij, ad sinum to-  
tius arcus.*

Sit sinus totus ab, dupletur & sit a b e; hac diametro  
fiat semi-circulus, in quo signetur arcus ille a e, bifariam in  
d diuisus: eius ergo dimidij quod est d e, extendatur com-  
plementum ab e versus c, quod sit arcus e h, cui & h e  
necessariò æquatur: quia

d e h quadrans æquatur  
reliquo quadranti arcuum  
a d & h e. Proinde du-  
cantur linea e i perpen-  
dicularis ad a i c, quæ idè  
sinus est arcus a d e: & li-  
nea a e, cuius dimidium



f e, est sinus arcus d e, qui est dimidium arcus a d e: &  
linea e c, cuius dimidium e g est sinus arcus e h, & idè  
est sinus complementi arcus d e: dimidium autem sinus to-  
tius a b sit a k. Dico ut a k se habet ad e f, ita e g ad e i  
se habebit: duo enim trianguli c e a, & c i e, æqui-anguli  
sunt: quia i c e, vel a c e angulus utrique communis est, &  
uterque c i e, & c e a rectus est, ille ex hypothesis, hic, quia  
in peripheria est, & semi-circulum occupat. Idèque ut a c  
hypotenusa trianguli c e a, ad eius minus latus a e; ita se  
habet c e hypotenusa triang. c i e, ad eius minus latus e i.  
Et quum totum a c se habeat ad a e, ut totum e c ad e i:  
sequetur inde dimidium a c, quod est a b, se habere ad  
a e, ut dimidium e c, quod est e g, se habere ad e i. Et de-  
nique cum iam totum a b est ad totum a e, ut e g ad e i:  
Concludimus necessariò dimidium a b, quod est a k, se  
habere ad dimidium a c, quod est f e: ut e g se habet ad

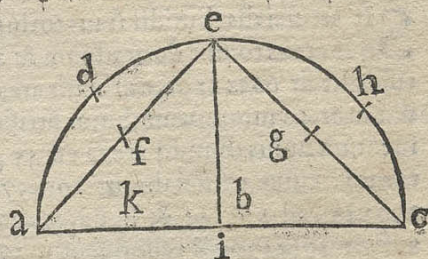
# CANONIS CONSTRUCTIO. 37

e i, quod erat demonstrandum.

56. *Duplum artificialis arcus 45 graduum, est artificialis dimidij  
sinus totius.*

Reperito præcedenti Schemate sit casus talis, quod a e, &  
e c, sint æquales. In hoc casu cadet i in b, eritque e i sinus  
totius, atque e f, & e g æquabuntur: eorumque quilibet si-  
nus est 45 graduum.

Et quia (per præce-  
dentem) quæ est pro-  
portio dimidij sinus  
totius a k, ad e f si-  
num 45 graduum: ea  
est etiam proportio  
e g sinus quoque 45  
graduum, ad e i iam  
sinum totum. Idè (per 37) duplum artificialis sinus 45  
graduum, æquale est artificialibus extremorum, scilicet sinus  
totius, & eius dimidij. At horum amborum artificiales, sunt  
tantum artificialis alterius eorum, scilicet dimidij sinus to-  
tius: quia reliqui scilicet ipsius sinus totius (per 27) artifi-  
cialis nullus est. Necessariò igitur duplum artificialis arcus  
45 graduum, est artificialis dimidij sinus totius, quod erat  
demonstrandum.



57. *Aggregatum ex artificiali dimidij sinus totius, & artificiali  
cuiusque arcus, æquatur aggregato artificialium dimidij eius ar-  
cus, & complementi huius dimidij. Vnde artificialis huius di-  
midij arcus haberi potest, caterorum trium artificialibus datis.*

Quia per penultimè præmissam, dimidium sinus totius  
proportionatur ad sinum dimidij alicuius arcus, ut sinus  
complementi eiusdem dimidij arcus, ad sinum totius arcus:  
Idè (per 38) aggregatum artificialium duorum extremor-  
um, scilicet artificialis dimidij sinus totius, & artificialis  
cuiusvis totalis arcus, æquabitur aggregato artificialium  
mediorum, videlicet artificialis dimidij eiusdem arcus, &  
artificialis complementi huius dimidij. Vnde & per eandem  
38, si addideris artificialem dimidij sinus totius (per 51, vel  
per præmissam inuentum) ad artificialem cuiusvis totalis  
arcus



### 32 MIRIFICI LOGARITHM.

arcus datum : & hinc substraxeris artificialem complementi dimidij prioris arcus datum, relinquetur ipse artificialis petitus eiusdem dimidij arcus : quæ erant demonstranda.

#### EXEMPLVM.

**S**it artificialis dimidij sinus totius (per 51) 6931469, sitque arcus totalis 69 graduum & 20 minutorum, cuius artificialis sit 665143 datus: totalis arcus dimidium est 34 graduum & 40 minutorum, huius artificialem quero. Complementum huius dimidij arcus est 55 graduum, & 20 minutorum, cuius artificialis sit 1954370 datus: Addo itaque 6931469 ad 665143, & fiet aggregatum 7596612: ex quo aufero 1954370, & relinquentur 5642242 artificialis quæ sit, arcus 34 graduum & 40 minutorum.

58. *Datis artificialibus omnium arcuum non minorum 45 gradibus, omnium arcuum minorum artificiales facillimè habentur.*

Ex artificialibus arcuum omnium non minorum 45 gradibus per hypothesein datis, habebis per præmissam, artificiales reliquorum omnium arcuum decrefcentium vsque ad vigesimum secundum gradum cum semisse. Ex quibus iam habitis, artificiales similiter reliquorum arcuum vsque ad 11 gradus & 15 minuta habebantur. Et ex his rursus, artificiales omnium arcuum vsque ad 5 gradus & 38 minuta. Et ita deinceps in primum vsque ad minutum.

59. *Tabulam Artificialem condere.*

Paginæ præparentur quadraginta quinque longiusculæ, ut præter margines superiorem & inferiorem, sexaginta etiam lineas numerales capere valeant. Paginarum quælibet lineamentis transuersis in 20 spatia æqualia diuidatur: spatiorum quoduis tres lineas numerales capere valeat. Inde aliis lineis descendens diuidatur pagina quæuis in columnas septem, interposita duplici linea inter columnas secundam & tertiam, & inter quintam & sextam; inter cæteras vero simplex ponatur linea. Prima pagina in fronte superiore laeuorsum supra tres primas columnas superscribatur hoc titulo | O Gradus | & superscribatur inferius & dextrosum sub

### CANONIS CONSTRUCTIO. 33

sub tribus ultimis columnis sic | 89 Gradus | Secunda pagina superscribatur laeuorsum sic | 1 Gradus | & subscribatur dextrosum sic | 88 Gradus | Tertia pag. superscribatur sic | 2 Gradus | & subscribatur sic | 87 Gradus | Et ita cū cæteris paginis procedendo, ut supra scripti infra scriptis additi, quadrantē vno minus siue 89 gradus semper compleant. Inde prima columna per singulas paginas titulum hunc superscriptum habeat | Minuta graduum superscriptorum | Secunda columna hoc titulo superscribatur | Sinus arcuum sinistrorum | Tertia columna hoc titulo superscribatur | Artificiales arcuum sinistrorum | Quarta columna hoc titulo & superscribatur & subscribatur | Differentia inter artificiales complementorum | Quinta columna subscribatur hac subscriptione | Artificiales arcuum dextrorum | Sexta columna subscribatur hac subscriptione | Sinus arcuum dextrorum | Septima columna subscribatur hac subscriptione | Minuta graduum infra scriptorum | Primæ deinde columnæ inferantur numeri minutorum ab 0 ad 60 progrediendo. Septimæ etiam columnæ inferantur numeri minutorum à 60 ad 0 decrefendo: ea lege, ut primæ & septimæ columnæ bina quæuis minuta in eadem linea opposita, gradum integrum seu 60 minuta perficiant. Exempli gratia, 0 ad 60, & 1 ad 59, & 2 ad 58, & 3 ad 57, &c. opponantur. Atque inter bina quæque viginti lineamentorum transuersorum, tres numeri in quolibet intervallo cuiuslibet columnæ contineantur. In secunda columna ponantur numeri sinuum, respondentium gradibus supra, & minutiis à latere laeuorsum in eadem linea positus. In sexta etiam columna ponantur numeri sinuum, respondentium gradibus infra, & minutiis à latere dextrosum in eadem linea positus. Hos sinus suppeditabit tibi communis sinuum REINHOLDI Tabula, vel si qua exactior. His peractis, omnium sinuum inter sinum totum & sinum dimidium, artificiales per 49 & 50: cæterorum verò sinuum artificiales per 54 computato. Siue aliter, multoque & exactius & facilius, omnium sinuum inter sinum totum & sinum 45 graduum artificiales, per eandem 49 & 50 computato: ex quibus jam habitis, omnes reliquorum arcuum minorum 45 gradibus artificiales, per



# 34 MIRIFICI LOGARITHM.

præmissam quàm facillimè acquies. Quibus omnibus artificialibus vtcunque computatis, in tertia columna locabis artificiales numeros respondentes gradibus suprâ, & minutiis à latere sinistro, suisque sinibus læuorsum in eadem linea positis. Similiter & in quinta columna locabis numeros artificiales respondentes gradibus infrâ, & minutiis à latere dextro, suisque sinibus dextrorsum in eadem linea positis. Media tandem columna sic perficitur: numerum quemque artificialem dextrum, ex artificiali sinistrorsum in eadem linea posito aufer, notatâ differentiâ in eadem linea interrutrumque, donec totam mediam columnam compleueris, Hanc Tabulam nos ad singula minuta computauimus, atque eruditis (quibus plus sit otii) eius exactiorem eliminationem, vt & Tabulæ sinuum emendationem relinquimus.

## Epitome Tabulæ artificialis aliter condendæ.

**Q**UONIAM nonnunquam artificiales per 54 inuenti, differunt ab artificialibus per 58 inuentis; vt huius sinus 378064, numerus artificialis per illam est 32752756, per hanc verò est 32752741 arguitur quibusdam in locis Tabula sinuum vitiosa esse. Qua propter consulo eruditis (quibus forsân discipulorum & computistarum copia sit) vt Tabulam sinuum exactiorem & maioris numeri edam, vtpote cuius sinus totus sit 100000000, scilicet octo cyphrarum præter unitatis figuram, cum prior sinus totus septem tantum constet. Deinde vt Tabula nostra prima contineat centum numeros, progredientes in ea proportione, qua est inter hunc nouum sinum totum, & sinum eo minorem unitate, vtpote inter 100000000, & 99999999.

Secunda Tabula contineat etiam centum numeros, in ea proportione, qua est inter hunc nouum sinum totum, & numerum eo minorem centenario, scilicet inter 100000000, & 99999900.

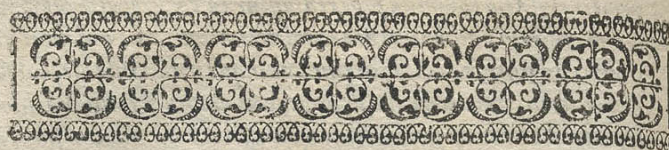
Tertia Tabula qua & radicalis dicitur, trigintaquinque columnas, & centum numeros in qualibet columna continet. Centum numeros

# CANONIS CONSTRUCTIO. 35

numeri eiusdem columna progrediantur in ea proportione, qua est decem millium, ad numerum eo minorem unitate, videlicet 100000000 ad 99990000. Tringinta quinque primi inter se, aut secundi, aut tertii, aut ceteri eiusdem ordinis omnium columnarum inter se progrediuntur ea proportione, qua est 100 ad 99, aut sinus totius 100000000 ad 99000000. In his suisque artificialibus inueniendis & continuandis, obseruentur regula ceteræ præcedentes. Atque ex completa sic radicali Tabula, omnium sinuum inter sinum totum & sinum 45 graduum artificiales, exactissimè per 49 & 50 reperies: atque ex artificiali arcus 45 graduum duplato, habebis artificialem dimidii sinus totius per 56. Et tandem ex his iam habitis, ceteros artificiales per penultimè præcedentem exquires, quos in ordinem Tabula per præcedentem rediges, & fiet Tabula, omnium certè Mathematicarum Tabularum præstantissima & ad vsus præclarissimos parata.

## Finis constructionis Tabulæ Artificialis.





# APPENDIX

## DE ALIA EAQVE

### PRÆSTANTIORE LOGA-

RITHMORVM specie construenda;

in qua scilicet, unitatis Logarithmus est 0.

**I**NTER varios Logarithmorum progressus, is est præstantior, qui cyphram pro Logarithmo unitatis statuit, & 10,000,000,000 pro Logarithmo denarii seu decupli instituit: cæterorum autem omnium Logarithmi, ex his stabilitis necessario consequuntur, & modus inveniendi eos varius est, quorum primus sic se habet.

LOGARITHMVM decupli datum, videlicet 10,000,000,000, decies partire per quinque, & fient inde numeri sequentes 2000000000, 4000000000, 8000000000, 16000000, 32000000, 6400000, 1280000, 256000, 5120, 1024. Horum ultimum decies etiam bipartire, & fient inde numeri sequentes 512, 256, 128, 64, 32, 16, 8, 4, 2, 1. Atque hi omnes numeri sunt Logarithmi. Quæramus igitur singulorum numeros vulgares, qui iis ordine respondent. Inter denarium ergo seu decuplum 10 atque unitatem (auctos calculi gratia quouis cyphris, utpote duodenis) capiantur quatuor media proportionalia, seu potius (per extractionem radicis supersolidæ) eorundem minimum, quod sit doctrina gratia A. Inter A & unitatem, capiatur similiter ex quatuor proportionalibus minimum medium, quod sit B. Inter B & unitatem, capiatur medium

quartum

quartum seu minimum, quod sit C. Et ita progredere per extractionem supersolidæ radicis, dividendo intervallum inter recens inuentum & unitatem, in quinque intervalla proportionalia seu in quatuor media; quorum omnium quartum seu minimum semper notetur, usque dum ad decimum medium minimum perveneris, quæ his notis signentur D, E, F, G, H, I, K. Computatis iam exactè hisce proportionalibus, perge, & inter K & unitatem quære medium proportionale, quod sit L. Sic inter L & unitatem cape medium proportionale, quod sit M. Sic simile medium inter M & unitatem, quod sit N. Eodem artificio (per extractionem quadratam) creentur inter quæcunque recentem numerum & unitatem, reliqua intermedia proportionalia, his notis signanda O, P, Q, R, S, T, V: Quorum proportionalium cuilibet, respondet ordine suis Logarithmus superioris seriei. Unde unitas erit Logarithmus numeri V, quicunque is fuerit, & 2 erit Logarithmus numeri T, & 4. numeri S, & 8 numeri R, 16 numeri Q, 32 numeri P, 64 numeri O, 128 numeri N, 256 numeri M, 512 numeri L, 1024 numeri K: Quæ omnia ex superiore constructione parent. Ex his autem iam constructis, constitui possunt aliorum Logarithmorum proportionalia, ium proportionalium Logarithmi. Nam sicuti in staticis ex additione ponderum unitatis, binarii, quaternarii, 8<sup>arii</sup>, & aliorum pariter parium numerorum, omnis creari potest ponderum numerus, qui apud nos iam Logarithmi sunt: Ita ex proportionalibus V, T, S, R, &c. quæ illis respondent, & ex cæteris etiam duplicata ratione creandis, constitui possunt omnium Logarithmorum oblatores, respondentia proportionalia, per eorundem inuicem multiplicationem respectuè, ut docebit experientia. Huius autem operis præcipua difficultas est in denis proportionalibus duodecim figurarum & sexaginta figuris supersolido more extrahendis: sed quanto maior hæc difficultas, tanto exactior est hic modus in Logarithmis proportionalium, & Logarithmorum proportionalibus inveniendis.



Alius modus facile creandi LOGARITHMOS numerorum compositorum, ex datis LOGARITHMIS suorum primorum.

**S**i duo numeri datorum Logarithmorum, inuicem multiplicati componunt tertium; eorum Logarithmorum aggregatum erit tertij Logarithmus.

Item si numerus per numerum diuisus producit tertium, à primi Logarithmo secundi subtractus, relinquit tertij Logarithmum.

Si ex numero in se quadratè, cubicè, supersolidè, &c. ducto, producit alter quinis, ex primi Logarithmo duplato, triplato, aut quintuplato, producit illius alterius Logarithmus.

Item si ex dato per extractionem quadratam, cubicam, supersolidam, &c. extrahatur radix, datique Logarithmus bisecetur, triseceetur, aut per quinque secetur, producit Logarithmus eiusdem radice.

Denique quicunque numerus vulgaris ex vulgaribus componitur per multiplicationem, diuisionem, aut extractionem: eius Logarithmus componitur respectiue per additionem, subtractionem, duplicationem, seu triplationem, &c. suorum Logarithmorum. Vnde sola difficultas est in numerorum primorum Logarithmis inueniendis, qui hac sequenti arte generali inueniuntur.

Ad omnes Logarithmos inueniendos, oportet duorum aliquorum vulgarium numerorum Logarithmos dari, aut saltem assumi pro fundamento operis, ut in superiore prima constructione, 0 seu cyphra assumebatur pro Logarithmo vulgaris unitatis, & 10,000,000,000 pro Logarithmo denarii seu 10. His itaque datis, queratur quinarium (qui primus numerus est) Logarithmus hoc modo. Inter 10 & 1 queratur medium propor-

proportionale, quod est  $\frac{316227766017}{100000000000}$ . Sic inter 10,000,000,000 & 0 queratur medium Arithmeticum, quod est 5,000,000,000. Deinde inter 10 &  $\frac{316227766017}{100000000000}$  capiatur medium Geometricum quod est  $\frac{562341325191}{100000000000}$ . Et similiter inter 5,000,000,000 & 0 capiatur medium Arithmeticum, quod est 7500000000.

In continuè proportionalibus vniuersis.

**V**T summa mediorum & alterutrius extremi, ad eundem extremum; sic differentia extremorum, ad differentiam extremi eiusdem & medij proximi.

Compendium dimidii Tabulæ LOGARITHMORVM.

**D**orum arcuum quadrantem complementum, ut sinus maioris, ad sinum dupli arcus; Ita sinus 30 graduum, ad sinum minoris. Vnde addito Logarithmo dupli arcus ad Logarithmorum 30 graduum; & à producto, subducto Logarithmo maioris, relinquitur Logarithmus minoris.

Habitudines LOGARITHMORVM & suorum naturalium numerorum inuicem.

**I.** **D**antur duo sinus & sui Logarithmi. Si totidem numeri aequales sinui minori in se ducantur, quot sunt unitates in maioris Logarithmo; & contra, totidem aequales sinui maiori in se ducantur, quot sunt unitates in minoris Logarithmo;



mo; erunt duo producta equalia, & producti sinus Logarithmus, erit numerus factus ex ambobus Logarithmis inuicem multiplicatis.

2. Ut sinus maior ad minorem; Ita velocitas incrementi, aut decrementi Logarithmorum apud minorem, ad velocitatem incrementi aut decrementi Logarithmorum apud maiorem.
3. Duo sinus in ratione duplicata, triplicata, quadruplicata, &c. habent suos Logarithmos in ratione dupla, tripla, quadrupla, &c.
4. Et duo sinus in ratione ut ordo ad ordinem, (id est ut triplicatum ad quintuplicatum, vel cubus ad super-solidum) habent suos Logarithmos, in ratione ut eorundem ordinum indices, id est, ut 3 ad 5.
5. Si primus sinus in secundum ductus producit tertium, Logarithmus primi additus secundi Logarithmo producit tertii Logarithmum. Sic in diuisione, diuisoris Logarithmus ex diuidendi Logarithmo subductus, relinquit quotientis Logarithmum.
6. Et si quot aequales primo, inuicem ducti producant secundum, totidem aequales primi Logarithmo, simul additi producant Logarithmum secundi.
7. Medium quoduis Geometricum inter duos sinus, habet suum Logarithmum medium tale Arithmeticum inter sinuum Logarithmos.
8. Sinus primus diuidit tertium, quoties sunt unitates in A; numerus secundus diuidit eundem tertium, quoties sunt unitates in B: Item idem primus diuidit quartum, quoties sunt unitates in C; & idem secundus diuidit eundem quartum, quoties sunt unitates in D. Dico, quae est ratio A ad B, eadem est C ad D, & Logarithmi secundi ad Logarithmum primi.
9. Hinc fit quod numeri oblati Logarithmus, est numerus locorum seu figurarum, quas comprehendit factum ex oblato toties in se ducto quoties sunt unitates in 10,000,000,000.
10. Item si index ordinis sit Logarithmus denarii, numerus figurarum (una dempta) ordinis scilicet multipli. erit Logarithmus radice.

Quæritur, quis numerus sit LOGARITHMVS binarii.  
Respon-

Respondeo, numerus locorum numeri facti ex 10,000,000,000 binariis inuicem ductis.

At dices, hic numerus factus ex 10,000,000,000 binariis inuicem ductis est innumerabilis. Respondeo, numerus tamen locorum eius (quem quaero) est numerabilis. Ex data itaque radice (binario) & indice (10,000,000,000) quaere numerum locorum multipli, & non numerum ipsius multipli; & per regulam nostram inuenies 301029995 &c. pro numero locorum quaesito, & LOGARITHMO binarii.

FINIS.





# LVCVBRATIONES

ALIQUOT  
DOCTISSIMI  
D. HENRICI BRIGGII

IN APPENDICEM præmissam.

Habitudines LOGARITHMORVM & suorum  
naturalium *numerorum inuicem; Si unitatis*  
LOGARITHMVS sit.

**D**ATIS duobus numeris cum suis logarith-  
mis, si communis aliquis diuisor virosque lo-  
garithmos diuiserit, & uterque numerorum  
datorum toties in seipsum ducatur, ut numerus  
factorum ab alterutro, unitate tantum super-  
etur à quoto alterno logarithmi, erunt duo  
producti æquales. Et logarithmus numeri producti, erit nu-  
merus continuè factus, à quotis logarithmorum & communi  
eorundem diuisore.

|                                                 |               |
|-------------------------------------------------|---------------|
|                                                 | Logarithmi.   |
| Sunto dati numeri { $\frac{25118865}{39810718}$ | $\frac{4}{6}$ |

Sit communis diuisor unitas,

Primus in seipsum quinquies } ductus facit 251188649  
Secundus in seipsum ter--- }

1000000

Loga-

## LVCVBRATIONES. 43

|                                        |                            | Logarithmi. |
|----------------------------------------|----------------------------|-------------|
| Conti-<br>nuè pro-<br>portio-<br>nales | 1 (0)                      | 0           |
|                                        | 25118865 (1) Latus         | 4           |
|                                        | 63095737 (2) Quadratus     | 8           |
|                                        | 158489331 (3) Cubus        | 12          |
|                                        | 39810718 (4) Biquadratus   | 16          |
|                                        | 100000000 (5) Solidus      | 20          |
|                                        | 251188649 (6) Quadr. cubus | 24          |

|                                 |               | Logarithmi. |
|---------------------------------|---------------|-------------|
| Continuè<br>propor-<br>tionales | 1 (0)         | 0           |
|                                 | 39810718 (1)  | 6           |
|                                 | 158489331 (2) | 12          |
|                                 | 630957379 (3) | 18          |
|                                 | 251188649 (4) | 24          |

### ALIUD EXEMPLVM.

|                                                  | Logarithmi.   |
|--------------------------------------------------|---------------|
| Sunto dati numeri { $\frac{316227766}{50118724}$ | $\frac{5}{7}$ |

Communis Logarithmorum diuisor sit 1  
Primus sexies } in seipsum ductus facit { 316227766  
Secundus quater }

F 2



|             | Logarith. |    |           | Log. |    |
|-------------|-----------|----|-----------|------|----|
| 1           | (0)       | 0  | 1         | (0)  | 0  |
| 316227766   | (1)       | 5  | 50118724  | (1)  | 7  |
| 10000000000 | (2)       | 10 | 251188642 | (2)  | 14 |
| 100         | (4)       | 20 | 630957376 | (4)  | 28 |
| 1000        | (6)       | 30 | 316227766 | (5)  | 35 |
| 316227366   | (7)       | 35 |           |      |    |

Notandum si communis diuisor sit unitas, ut in utroque exemplo precedente; factus ab ipsis datis Logarithmus, est Logarithmus numeri producti. Quia unitas multiplicans non auget multiplicatum.

## TERTIVM EXEMPLVM.

|                      | Logarithmi. |            | Quoti. |
|----------------------|-------------|------------|--------|
| Sunto dati numeri    | { 343       | 2.53529412 | 3      |
|                      | { 823543    | 5.91568628 | 7      |
| Sit communis diuisor | 84509804    |            |        |

|                   |    |                    |     |             |
|-------------------|----|--------------------|-----|-------------|
| Notandum numerus. | 3  | 343                | (1) | 2.53529412  |
|                   | 6  | 117649             | (2) | 5.07058824  |
|                   | 8  | 40353607           | (3) | 7.60588236  |
|                   | 11 | 3841287101         | (4) | 10.14117648 |
|                   | 18 | 558545864083284007 | (7) | 17.74705884 |
|                   | 6  | 823543             | (1) | 5.91568628  |
|                   | 12 | 678223072849       | (2) | 11.83137256 |
|                   | 18 | 558545864083284007 | (3) | 17.74705884 |

Datorum LOGARITHMORVM quoti sunt 3. 7. factus ab iis 21. qui ductus in communem diuisorem 84509804

84509804 facit 17.74705884 LOGARITHMVM numeri producti.

Notandum quod Cubus secundi numeri, eique aequalis septimus figuratus primi; (quem aliqui appellant secundum solidum) scribitur notis octodecim: idcirco eius Logarithmus in fronte gerit 17. prater notas subsequentes, qua exprime Logarithmum numeri, qui iisdem notis scribitur: sed eius prima tantum nota versas sinistram, denotat nobis integras unitates quinque, reliqua nota subsequentes, exprimunt partes, integris hisce adiciendas. Sic  $5 \frac{5154586408}{1000000000}$ , &c. cuius Logarithmus 74705884.

Quod si quatuor loci relinquuntur integris, ponenda erit in fronte Logarithmi, nota 3. Sic  $5585 \frac{4586408}{10000000}$ , &c. cuius Logarithmus 3.74705884.

Hinc poterimus datis duobus LOGARITHMIS  
& sinu primi, inuenire sinum secundi.

Sumatur communis aliquis Logarithmorum diuisor (quò maior fuerit eo commodior erit) is diuidat utrumque: deinde primus sinus seipsum multiplicet, & suos factos: donec numerus factorum unitate tantum superetur à quoto secundi Logarithmi: vel donec procreetur figuratus, cognominis quoto secundi Logarithmi. Idem numerus produceretur, si secundus sinus quassius, seipsum multiplicaret, donec fieret figuratus, cognominis quoto primi Logarithmi. Ut patet per precedentem propositionem. Huius uaque figurati, à primi quoto denominati latus quaratur: quod, ubi inuentum fuerit, erit sinus secundus quassius. Eritque continuè factus à quotis, & communi diuisore, ipsius figurati Logarithmus.

Ut sunt dati LOGARITHMI 8.14, & sit sinus primi 3 communis LOGARITHMORVM diuisor est 2, qui dat quotos 4. 7. Si 3 seipsum sexies multiplicet, proueniet 2187, pro figurato, qui in serie continuè proportionalium ab unitate, septimum locum occupabit: & inde dici poterit non



incommodè septimus figuratus. Idem numerus 2187, in alia continuè proportionalium serie, est ab unitate figuratus quartus: cuius latus 6 <sup>838521</sup> est sinus secundus quæsitus.

Quoti 4 7. factus ab iis 28. qui ductus in communem diuisorem 2 facit 56. LOGARITHMVM figurati 2187.

|                                        |      | Logar. |    |          | Log. |
|----------------------------------------|------|--------|----|----------|------|
| Conti-<br>nuè pro-<br>portio-<br>nales | 1    | (0)    | 0  | 1        | (0)  |
|                                        | 3    | (1)    | 8  | 6838521  | (1)  |
|                                        | 9    | (2)    | 16 | 46765372 | (2)  |
|                                        | 27   | (3)    | 24 | 31980598 | (3)  |
|                                        | 81   | (4)    | 32 | 2187     | (4)  |
|                                        | 243  | (5)    | 40 |          | 56   |
|                                        | 729  | (6)    | 48 |          |      |
|                                        | 2187 | (7)    | 56 |          |      |

Notandum hos logarithmos diuersos esse ab iis, qui ad illustrationem superioris Propositionis adhibebantur: in hoc autem conueniunt, quod utrobique Logarithmus unitatis est 0. quo posito, Logarithmi eorundem numerorum vel sunt æquales, vel saltem proportionales inter se.

Sinus primus diuidit tertium ) debet primus diuidere tertium, & tertii quotum, & quoti deinceps quotum quemlibet, quoties poterit, donec quotus ultimus sit minor diuisore. Deinde diuisionum harum numerus notetur, non autem quoti alicuius quantitas, ( nisi forte minimi, de quo mox plura dicemus ) eodem modo secundus, eundem tertium eiusque quotus diuidat. Ita etiam diuidatur ab utroque quartus. V

|             |          |    |
|-------------|----------|----|
| Sunto sinus | primus   | 2  |
|             | secundus | 4  |
|             | tertius  | 16 |
|             | quartus  | 64 |

Primus 2, diuidit tertium 16, quater. Sumque quoti 8. 4. 2. 1. Secundus 4, diuidit eundem tertium 16, bis. Sumque quoti 4. 1. erunt igitur, A, 4. B, 2.

Eodem modo primus 2, diuidit quartum 64, sexies. Quotique sunt 32. 16. 8. 4. 2. 1.

Secundus 4, diuidit quartum 64, ter. Quotique sunt 16. 4. 1. Sunt igitur C, 6. D, 3. aio ut A, 4. ad B, 2: sic C, 6. ad D, 3. & sic Logarithmus secundi, ad Logarithmum primi.

Si in hisce diuisionibus, vltimus & minimus quotus ubique sit unitas, ut in istis quatuor propositis: erunt numeri quotorum, & Logarithmi diuisorum, reciproce proportionales. Alias ratio non erit prorsus eadem utrobique: veruntamen si diuisores fuerint exigui & diuidendi satis magni, ita ut quoti sint plurimi; defectus iste proportionalium, vix aut ne vix quidem percipi poterit.

Hinc fit quod numeri oblati Logarithmus.

Sumantur duo numeri 10. & 2, vel quouis alius; & sit Logarithmus primi datus, scilicet 100, quaritur Logarithmus secundi, Primò, secundus seipsum toties multiplicet, ut numerus factorum, unitate tantum superetur, à dato primi Logarithmo. Deinde vltimus factus, diuidatur per primum numerum 10, quoties fieri poterit; & eodem modo per secundum. Erit autem numerus quotorum, facti à secundo diuisi, 100. (quia factus iste est figuratus centesimus. Et si numerum aliquoties in seipsum ductus, faciet aliquem; idem numerus factum toties diuidet, & semel vltimus. ut 3 in seipsum quater ductus, facit 243. idem 3, diuidit 243 quinquies, & quoti erunt 81. 27. 9. 3. 1.) Deinde si idem factus diuidatur à primo 10, manifestum est, numerum quotorum, unitate tantum minorem esse numero locorum in diuiso. Idcirco cum idem factus diuidatur à datis duobus numeris, quoties fieri potest: erunt (per præcedentem propositionem) numeri quotorum, & Logarithmi diuisorum, reciproce proportionales. Est autem numerus quotorum secundi, equalis Logarithmo primi: idcirco numerus quotorum primi (id est numerus locorum in facto, quo dempto,) æquabitur Logarithmo secundi.

NUMERI



| NUMERI<br>LOCORUM<br>SEU<br>NOTARUM | I             |         |
|-------------------------------------|---------------|---------|
|                                     | I             | I       |
| 1                                   | 2             | 1       |
| 1                                   | 4             | 2       |
| 2                                   | 16            | 4       |
| 3                                   | 256           | 8       |
| 4                                   | 1024          | 16      |
| <hr/>                               |               |         |
| 7                                   | 1048576       | 128     |
| 13                                  | 1099511627776 | 4096    |
| 25                                  | 1208925819614 | 32768   |
| 31                                  | 1267650600228 | 1048576 |
| <hr/>                               |               |         |
| 61                                  | 16069379676   | 1048576 |
| 121                                 | 25822496318   | 4096    |
| 241                                 | 66680131608   | 32768   |
| 301                                 | 107150835165  | 1048576 |
| <hr/>                               |               |         |
| 603                                 | 114813014767  | 1048576 |
| 1205                                | 131820283599  | 4096    |
| 2409                                | 17316587168   | 32768   |
| 3011                                | 19950583591   | 1048576 |

Hic videmus, LOGARITHMVS denarii sit 10, nota seu loci in decimo figurato sunt quatuor. Idcirco LOGARITHMVS binarii erit 3, & amplius. In centesimo figurato numerus notarum est 31: in millesimo, 301: in 10000, 3011, & quod plures fuerint facti, eò propius acceditur ad verum LOGARITHMVM quæsitum: in minoribus enim factis partes vltimo quoto adhaerentes rationes perturbant aliquantulum. Verum si ponatur LOGARITHMVS denarii, esse 10,000,000,000; Et binarius in seipsum toties ducatur,

VI

ut factorum numerus, vnitatem tantum superetur à dato LOGARITHMO: erit numerus locorum in vltimo facto deampnata vnitatem, LOGARITHMVS binarii satis accuratus; quia particula vltimo quoto adjecta, in numeris adeò magnis, frustra conabatur proportionem impedire.

F I N I S.

G





# PROPOSITIONES

## QVÆDAM EMINENTISSIMÆ AD TRIANGVLA

sphærica, mirâ facilitatē resoluenda.

Triangulum sphæricum resolvere, absque eiusdem diuisione in duo quadrantalia aut rectangula.

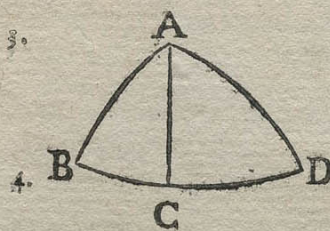
### PROPOSITIO PRIMA.



**D**ATIS tribus lateribus, angulum quemvis propalare. Et contrā.

Ex tribus datis angulis latus quoduis inuenire.

Perficitur hoc omnium optimè, per tres modos LOGARITHMORVM nostrorum, Cap. 6. Sect. 8a. 9a. 10a. descriptos.



Datis latere AD, & angulis  $\angle$  B, latus AB inuestigare.

Duc sinum AD in sinum D, productum diuide per sinum B, & proueniet sinus AB.

Datis latere AD, & angulis  $\angle$  D & B, latus BD acquirere.

Duc sinum totum in sinum complementi D, & diuide per tangentem complementi AD, & fiet tangens CD arcus; deinde

## TRIGONOMETRICÆ.

deinde duc sinum CD, per tangentem D, & diuide productum per tangentem anguli B, & fit sinus BC; adde aut substrahe BC & CD, & fit BD.

5. Datis latere AD, & angulis D & B, angulum A inuenire.

Duc sinum totum in sinum complementi AD, & diuide per tangentem complementi D anguli, & proueniet tangens complementi CAD; & sic habetur ipse CAD angulus. Similiter duc sinum complementi B anguli, per sinum CAD, & diuide per sinum complementi D, & fit sinus anguli BAC; quo addito vel subtracto ex CAD proueniet BAD quæsitus.

6. Datis AD, & D angulo cum latere BD, inuenire angulum B.

Duc sinum totum in sinum complementi D, & diuide per tangentem complementi AD, & fiet tangens CD; cuius arcum CD aufer (vel aliàs adde) à latere BD, & fit BC. deinde duc sinum CD, per tangentem D, & diuide productum per sinum BC, & fit tangens anguli B.

7. Datis AD, & D angulo cum latere BD, inuenire latus AB.

Duc sinum totum in sinum complementi D, & diuide productum per tangentem complementi AD, & fiet tangens CD; cuius arcum CD, auferit vel adde lateri BD dato, & fit BC. Deinde duc sinum complementi AD, per sinum complementi BC, productam diuide per sinum complementi CD, & proueniet sinus complementi AB: & ita ipse AB habetur.

Sequi videtur, ex AD & D angulo cum latere BD datis, inuenire angulum A seu BAD: sed hic situs triplicem requireret Regulam TRIVM. Mutato igitur A pro B, & B pro A, erit problema sic. Datis BD & D, cum latere AD, inuenire angulum B. Quod prorsus idem est cum septimo problemate, & duplici tantum regula Trium expeditur.

8. Datis AD & angulo D, & latere AB, angulum B inuenire.

Duc sinum AD in sinum D, & productum diuide per sinum AB, & producit sinus anguli B.



9. *Datis A D, & angulo D, & latere A B, latus B D, inuenire.*

Duc sinum totum in sinum complementi D, & diuide productum per tangentem complementi A D, & fiet tangens C D arcus. Deinde duc sinum complementi C D, in sinum complementi A B, & productum partire per sinum complementi A D, & proueniet sinus complementi B C. Ipsiusmet ergo B C & C D arcuum summa, vel differentia, est latus B D quæsitum.

10. *Datis A D, & angulo D cum latere A B, angulum A seu B A D inuenire.*

Duc sinum totum in sinum complementi A D, productum diuide per tangentem complementi D, & proueniet tangens complementi C A D; & sic habetur ipse C A D angulus. Deinde duc tangentem A D, per sinum complementi anguli C A D, productum diuide per tangentem A B, & proueniet sinus complementi B A C; & inde B A C ipse: cuius, & C A D arcuum summa, vel differentia, est B A D angulus quæsitus.

11. *Datis A D angulo D, cum angulo, A, latus A B exquirere.*

Duc sinum totum in sinum complementi, A D, & diuide productum per tangentem complementi D anguli, & proueniet tangens complementi C A D, & sic habetur ipse C A D angulus: cuius, & integri anguli A differentia, (vel aliàs summa) est angulus B A C. Deinde duc tangentem A D, in sinum complementi C A D, productum partire per sinum complementi B A C, & proueniet inde tangens A B.

12. *Datis A D & angulo D, cum angulo A, angulum tertium B inuenire.*

Duc sinum totum in sinum complementi A D, & diuide productum per tangentem complementi anguli D, & proueniet sinus complementi anguli B, & inde ipse angulus B quæsitus.

Sequi videtur, ex A D, & D, & A angulis, inuenire B D latus: sed in hoc sum triplicem requirit regulam Trium. Martis igitur A in D, & D in A, erit problema sub hac forma.

*Datis*

*Datis D A, & A, & D angulis, inuenire B A.* Proflus idem cum problemate 11. & duplici tantum Regula Trium expeditur.

*De semi-sinuum versorum, præstantia & vsu.*

1. *Datis duobus lateribus & angulo intercepto, tertium latus inuenire.*

Semi-sinum versum differentiarum crurum, aufer ex semi-sinu verso aggregati crurum; reliquum multiplica per semi-sinum versum anguli verticalis intercepti: & productum diuiso per sinum totum, adde semi-sinum versum differentiarum crurum, & prodibit semi-sinus versus basis optata.

Eadem ratione ex basi & angulis iuxta eam, reperitur tertius angulus verticalis.

2. *Contra ex tribus lateribus inuenire angulum quemuis.*

Ex semi-sinu verso basis aufer semi-sinum versum differentiarum crurum in sinum totum ductum; reliquum diuide per semi-sinum versum aggregati crurum, minutum semi-sinu verso differentiarum crurum: & prodibit semi-sinus versus anguli verticalis quæsitus. Eadem ratione ex tribus angulis inuestigantur latera.

3. *Datis duobus arcibus tertium dare, cuius sinus aquetur differentie sinuum priorum.*

Sit arcus 38:1, eius Logarithmus 484504: arcus alter 77 gr. Horum accipe complementa 51:59, & 13 gr. quorum semi-aggregatum est 32:29, semi-differentia verò est 19:25: quorum Logarithmi sunt 621656 & 1098914: quos adde, fiet 1719670; à quo productum subtrahere 693147, & remanebit 102623 Logarithmus 21 gr. vel idcirca. Dico sinum rectum 21 gr., qui est 358368, æqualem esse differentia sinuum arcuum 77, 38:1; qui sinus sunt 974370, & 615891 plus minus.

4. *Dato arcu, dare Logarithmum eius sinus versi.*

Sit arcus 13 gr, cuius dimidium 6:30; eius Logarithmus 2177570, cuius duplum est 4367140: à quo aufer 693147, & remanebit 3663993, cuius arcus est 1:28, & numerus in-



ter sinus positus est 25595 : atque is est sinus versus quæritus 13 gr.

5. *Datis duobus arcibus tertium dare, cuius sinus æquetur aggregato sinuum priorum arcuum.*

Sit vnus arcus 38 : 1, alter arcus 1 : 28 : eorum aggregatum est 39 : 29, & eorum differentia est 36 : 33 : semi-aggregatum autem est 19 : 44, semi-differentia verò est 18 : 16, Adde ergo Logarithmum semi-aggregati, qui est 1085659, ad Logarithmum differentia, qui est 518313, & fit productum 1603968 : à quo aufer Logarithmum semi-differentia, qui est 1160177, remanent 443791 Logarithmus : cui respondet arcus 39 : 56, sinus verò 641896. Qui quidem sinus æquatur vtriq; sinui 38 : 1, qui est 615661 : & sinui 1 : 28, qui est 25595 aut iuxta.

6. *Dato arcu & Logarithmo sui sinus recti, arcum dare, cuius sinus versus sit priori sinui recto æqualis.*

Sit arcus 39 : 56, cui respondet Logarithmus 443791 (ignoto sinu recto,) Logarithmo 443791 adde Logarithmum 693147, fient 1136938. Logarithmum hunc bipartire, & fiet Logarithmus 568469 : cuius arcum 34 : 30 duplicat, & fient inde 69 gr. arcus qui quærebatur. Dico enim quod sinus rectus 39 gr. & 56, est æqualis sinui verso 69 gr. : vterque enim sinus est 641800, aut propè.

7. *Trianguli Sphærici A B D, datis cruribus & angulo verticali, basin dare.*

**S**IT Triangulum Sphæricum A B D, detur angulus verticalis A, 120 gr. 24 42 : crus alterum ambientium detur 34, crus reliquum 47 gr. dimidium anguli verticalis 60 : 12 : 24, cuius Logarithmus 141766 : eius duplo 283533, adde Logarithmos crurum 581260 & 312858, fit summa 1177651 : qui est Logarithmus semi-differentia sinuum versorum basis & differentia crurum : atque idem est Logarithmus sinus recti 17 : 56 ; quem arcum, inuentum secundum appellamus : est enim inuentum primum quod sequitur. Differentiam crurum 13 bipartite fient 6 : 30 : cuius Logarithmum 2178570 duplica, & fient 4357140 pro Logarithmo dimidii sinus versi 13 gr., & pro Logarithmo sinus recti 0 gr. 44 : quem arcum

44 pro

44 pro inuento primo habemus. Horum inuentorum aggregatum est 18 gr. 40, & eius Logarithmus est 1139241 : semi-aggregatum autem est 9 gr. 20, eius Logarithmus est 1819061 : differentia verò est 17 gr. 12, & eius Logarithmus est 1218382, semi-differentia verò est 836, cuius Logarithmum 1900221. Adde ergo Logarithmum semi-aggregati 1819061, Vel ad hunc Logarithmum Vel ad anti-logarithmum 1218382, & fiet productum semi-differentia, qui est 3037443 : à quo aufer Logarithmum 1900221, & remanebunt 1137222. fient 1830368 : hinc substrahe 693147, & restat 1137221.

Hos bipartire, fient 568611, cuius Logarithmi arcus est 34 : 30, quem arcum duplica, & fiet basis quæsitæ 69 graduum.

Conuersum huius problematis, ad inueniendum angulum ex datis lateribus habetur lib. Logar. Cap. 6. Sect. 8. sed partim per Logarithmos, partim per arcuum prostaphæresin.

Notandum in præcedenti & sequentibus problematis nullà opus esse casuum obseruatione : specie enim omnium partium vnâ cum quantitate, ex ipso calculo procedunt.

*Sequitur alia conuersio præcedentis directæ.*

**D**A T A M basin 69 gr. bipartire, fiet 34 : 30, cuius Logarithmus est 568611 : quem duplica fient 1137222 : cuius arcum 18 gr. 42, pro inuento primo nota : superioris autem Logarithmi 4357140 arcum 0 gr. 44, pro inuento secundo nota. Horum arcuum complementa sunt 89 : 12, & 71 : 18 : horum semi-aggregatum est 80 : 15, & eius Logarithmus 14449 : semi-differentia verò 8 : 59, eiusq; Logarithmus 1856256 : quos adde, fient 1871405 : à quibus substrahe 693147, & relinquentur 1178258, cuius arcus est 17 gr. 56, quem arcum, inuentum tertium hic vocamus : à cuius Logarithmo aufer Logarithmos crurum 581260 & 312858, & relinquentur 283533, quem bipartire, fient 141766 Logarithmus semi-anguli verticalis 60 : 12 : 24. Totus ergo angulus



angulus verticalis quaesitus est 120: 24: 49.

*Regula alia prosthapherica inuentionis basis.*

**S**emi-differentiam sinuum versorum aggregati & differentiarum crurum nota: Nota etiam semi-sinum versum anguli verticalis. Notatos hos inter sinus rectos quaere, & semi-differentiam sinuum versorum aggregati & differentiarum suorum arcuum in Tabula occurrentium, pro inuento secundo signabis: & pro inuento primo capiaturs semi-sinus versus differentiarum crurum. Haec inuenta adde, & proueniet semi-sinus versus basis quaesita.

Contra autem ex semi-sinu verso basis, aufer primum inuentum, quod est semi-sinus versus differentiarum crurum, & prodibit secundum inuentum: quod per quadratum sinus totius, ductum & diuisum per semi-differentiam sinuum versorum aggregati & differentiarum crurum, relinquit in quotiente semi-sinum versum anguli verticalis quaesiti.

*Ex quinque partibus trianguli sphaerici, quarum tres media dantur, duas extremas uno opere inuenire. Aut alias, datis duobus angulis apud basin cum basi, verumque crus sic habetur.*

(\*) **A**ngulorum apud basin aggregatum, semi-aggregatum, differentiam, & semi-differentiam, una cum suis logarithmis nota. Inde logarithmos semi-aggregati & differentiarum, & differentialem semi-basis adde: & hinc subducto logarithmum aggregati, & Logarithmum semi-differentiarum; & produceretur differentialis, qui est primum inuentum. Deinde logarithmum semi-differentiarum, & differentialem semi-basis adde: hinc aufer Logarithmum, semi-aggregati, & produceretur differentialis, qui est inuentum secundum inuentos hos differentiales, quia veri sunt, quaere inter numeros differentiales: eorum arcus adde, & habebis crus maius; similiter minorem à maiore substrahe, & habebis crus minus.

*Aliter pro cruribus inueniendis.*

**A**ngulorum apud basin Logarithmum semi-aggregati, antilogarithmum semi-differentiarum, & differentialem semi-

semi-basis adde: & aufer Logarithmum aggregati & 693147, & fiet primum inuentum. Deinde Logarithmum semi-differentiarum, anti-logarithmum, semi-aggregati, & differentialem semi-basis adde: & hinc aufer Logarithmum aggregati & 693147, & fiet inuentum secundum. Cum inuentis age ut supra, & habebis crura.

*Idem aliter.*

**S**ecantem complementi aggregati angulorum apud basin, duc per tangentem semi-basis: productum duc primo per sinum anguli maioris apud basin, & fit inuentum primum. Secundo duc per sinum minoris anguli, & fit inuentum secundum. Hos ergo inuentos diuisos per quadratum sinus totius adde, & fit tangens semi-aggregati crurum: similiter maiorem à minore substrahe, & fiet tangens semi-differentiarum crurum. Eorum ergo arcuum utrumque adde, & fiet crus maius: similiter minorem arcum à maiore aufer, & fiet crus minus.

*Quinque partium proximarum Trianguli sphaerici datis tribus mediis, utramque extremam uno opere, & absque casuum observatione inquirere.*

(\*) **A**ngulorum apud basin, ut sinus semi-differentiarum, ad sinum semi-aggregati: Ita sinus differentiarum, ad quartum quod est aggregatum sinuum.

Et ut sinus aggregati, ad hoc aggregatum sinuum: Ita tangens semi-basis, ad tangentem semi-aggregati crurum.

Inde ut sinus semi-aggregati angulorum, ad sinum semi-differentiarum: Ita tangens semi-basis, ad tangentem semi-differentiarum crurum.

Horum inuentorum tangentium arcus, è Tabula tangentium extractos adde, & prodibit crus maius; sic minorem à maiore substrahe, & prodibit crus minus.

F I N I S.

H





# ANNOTATIONES

ALIQUOT

DOCTISSIMI D.  
HENRICI BRIGGII

IN PROPOSITIONES PRÆMISSAS.



ATO Arcu dare Logarithmum eius sinus versi  
ad huius propositionis finem \* \* ego libenter  
adicerem. Et contrà, Dato Logarithmo sinus versi,  
invenire eius arcum.

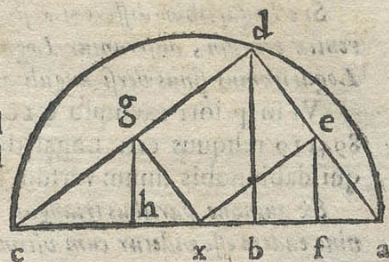
Logarithmo 30:6.693147, addatur Logarithmus datus si-  
nus versi quaesiti: semissis totius, est Logarithmus dimidiij arcus  
quaesiti.

Vt sit Logarithmus datus 35791 sinus versi ignoti, cuius  
arcus etiam ignoratur: huic addatur 693147 summa erit  
728938 cuius semissis 364469 est Logarithmus 43:59:33.  
est igitur datus Logarithmi arcus 87:59:6. cuius sinus ver-  
sus 9648389.

Si datus fuerit Logarithmus defectivus ---54321, & qua-  
ratur eius sinus versus: addatur vt antea 693147. summa  
(id est numerus reliquus, quia signa sunt contraria) erit  
638826, cuius semissis 319413, est Logarithmus 46:36:  
6, qui duplicatus est 93:12:6, cuius sinus versus 10558216,  
cum sit maior radio, habet Logarithmum defectivum  
---54321.

DEMONSTRATIO.

$\left. \begin{matrix} cb \\ ab \end{matrix} \right\} \begin{matrix} \text{sinus versi ar-} \\ \text{cuum} \end{matrix} \left\{ \begin{matrix} cd \\ ad \end{matrix} \right.$



$\left. \begin{matrix} xc \\ eg \\ ch \end{matrix} \right\} \begin{matrix} \text{pro-} \\ \text{port.} \end{matrix} \left\{ \begin{matrix} xa \\ ae \\ af \end{matrix} \right\} \begin{matrix} \text{pro-} \\ \text{port.} \end{matrix}$

$\left. \begin{matrix} xc \text{ sinus } 30:6 \\ cg \text{ sinus } \text{arcus } cd \\ cb \text{ dupla } ch \text{ rectæ} \end{matrix} \right\} \begin{matrix} \text{pro-} \\ \text{port.} \end{matrix}$

Tandem sensi sextam propositionem sequentem, hoc ipsum  
eodem prorsus modo prestare.

Trianguli spherici  $ABD$

Alium modum pro inuentione basis sequi possumus sic.

Si Logarithmus sinus versi, dati anguli, addatur Logarith-  
mis crurum: summa erit Logarithmus differentia sinuum ver-  
sorum, differentia crurum & basis quaesita. Idcirco per Loga-  
rithmum inuentum, quaratur differentia sinuum versorum, huic  
differentia addatur sinus versus differentia crurum, summa erit  
sinus versus basis quaesita.

Vt in hoc exemplo: Crura 34. 47, eorum Logarithmi  
581261. 312858. Logarithmus sinus versi dati anguli defe-  
ctivus ---409615, qui additus superioribus (quod fit per  
subductionem, quia signa sunt contraria) dat 484504, Lo-  
garithmum differentia sinuum versorum, basis & differen-  
tia crurum.

Linea verd huic Logarithmo respondens, siue sit sinus  
versus siue rectus, est 6160057, quæ est differentia sinuum  
versorum basis & differentia crurum. Cui, si addatur sinus  
versus differentia crurum 02563000, summa 6416357 erit  
sinus versus basis quaesita: qui ablati e radio, relinquit  
3583643 sinum rectum complementi basis 21:6. est igitur  
basis 69:6.



Et contra datis tribus lateribus, inuenitur angulus quilibet.  
Si e Logarithmo differentia sinuum versorum, basis & differentia crurum, auferantur Logarithmi crurum, reliquus erit Logarithmus sinus versi anguli quaesiti.

Vt in priori exemplo e Logarithmo 484504 auferatur 894119 reliquus erit Logarithmus defectiuus -- 409615 qui dabit nobis sinum versum anguli quaesiti. 120:24:49.

Ex quinque partibus trianguli spherici ] Haec propositio omnino eadem esse videtur cum vltima, qua ad finem adiecta, eodem modo a me notatur sic (\*) Hanc ego praestantissimam esse lubentissime existimo. Sunt autem tres operationes, qua in vltima magis sunt distincta, earum duas priores in vnam coniicio, sic.

Sunto data basis 69. 6.

Anguli ad basin

42:29:59  
31:6:5

73:36:4 summa  
36:48:2 semi-summa  
53:11:58 comp. semi-summa  
11:23:54 differentia  
5:41:57 semi-differentia  
84:18:3 comp. differentia

Logarithmi

1. Prop. Sinus semi-differentiae 5:4:57 23095560  
Sinus semi-aggregati 36:48:2 5124410  
Sinus differentiae 11:23:54 16213641  
Summa sinuum ---1757509

2. Prop. Sinus aggregati 73:36:4 415312  
Summa sinuum ---1757509  
Tangens semibasis 34:30:0 3750122  
Tang. summae crurum 40:30 1577301

Logarithmi

3. Prop. Sinus aggregati angulorum 36:48:2 5124410  
Sinus semi-differentiae angulorum 5:41:57 23095560  
Tangens semi-basis 34:30:0 3750122  
Tangens differentiae crurum 6:36:0 2172127

40:36

6:30

47:0

34:0

crura

Haec sunt operationes ab auctore traditae. Ego vero, vnam pro duabus primis constituo, tertiam vero seruo.

Logarithmi

Pro- Sinus compl. summae angulorum 53:11:58 2222368  
port. Sin. comp. differentiae angulorum 84:18:3 49553  
Tangens semibasis 34:30:0 3750122  
Tangens semisummae crurum 40:30:0 1577307

ALIUD EXEMPLVM.

Sunto datus angulus 47:6.

Crura comprehenduntur

59:35:11  
31:6:5

90:41:16 summa  
45:20:38 semi-summa  
44:39:22 compl. semi-summa  
28:29:6 differentia  
14:14:33 semi-differentia  
75:45:27 com. semi-differentia

Logar.

1. Prop. Sinus compl. summae crurum 44:39:22 3526118  
Sinus compl. differentiae crurum 75:45:27 312192  
Tangens compl. anguli vertic. 66:30 -- 8328403  
Tang. sum. angul. ad basin 72:30 -- 11452329

Logar.

2. Prop. Sinus semi-summae laterum 45:20:38 3406418  
Sinus semi-differentiae laterum 14:14:33 14023154  
Tangens com. semiang. vert. 66:30:0 -- 8328403  
Tang. semidiff. ang. ad basin 38:30 2288335

H 3



72:36

38:30

111:0

34:0

} Anguli ad basim

Atque hæc omnia constantissimè seruantur, siue dati fuerint duo anguli, cum latere interiecto: siue duo crura, cum angulo comprehenso. Hoc tantum interest, quod tertium proportionis locum, in vtraque operatione: illic, Tangens semibasis occupat: hic, Tangens compl. semibasis anguli verticalis. In his exemplis, si Tangens vel summa finium, sit maior Radio circulari: Logarithmus est defectiuus, & habet virgulam præcedentem sic --- 8;28403.

*Idem aliter]*

Hos ergo inuentos diuisos per quadratum sinus totius adde) Ego sic potius scriberem, quò res esset manifestior. Horum ergo inuentorum, per quadratum sinus totius diuisorum, quotos adde, & fiet Tangens, &c.

*Hæc propositio verissima est, ut & proxime antecedens; sed illa per Logarithmos commodissimè expedietur, hæc tota, vix poterit Logarithmorum operationes admittere: quia quoti sunt addendi & auferendi, ut Tangentes inueniamur. Logarithmorum autem usus cernitur in proportionalibus, & idcirco in multiplicatione & diuisione: non autem in additione aut subtractione.*

F I N I S.

*Extrait du Priuilege du Roy.*

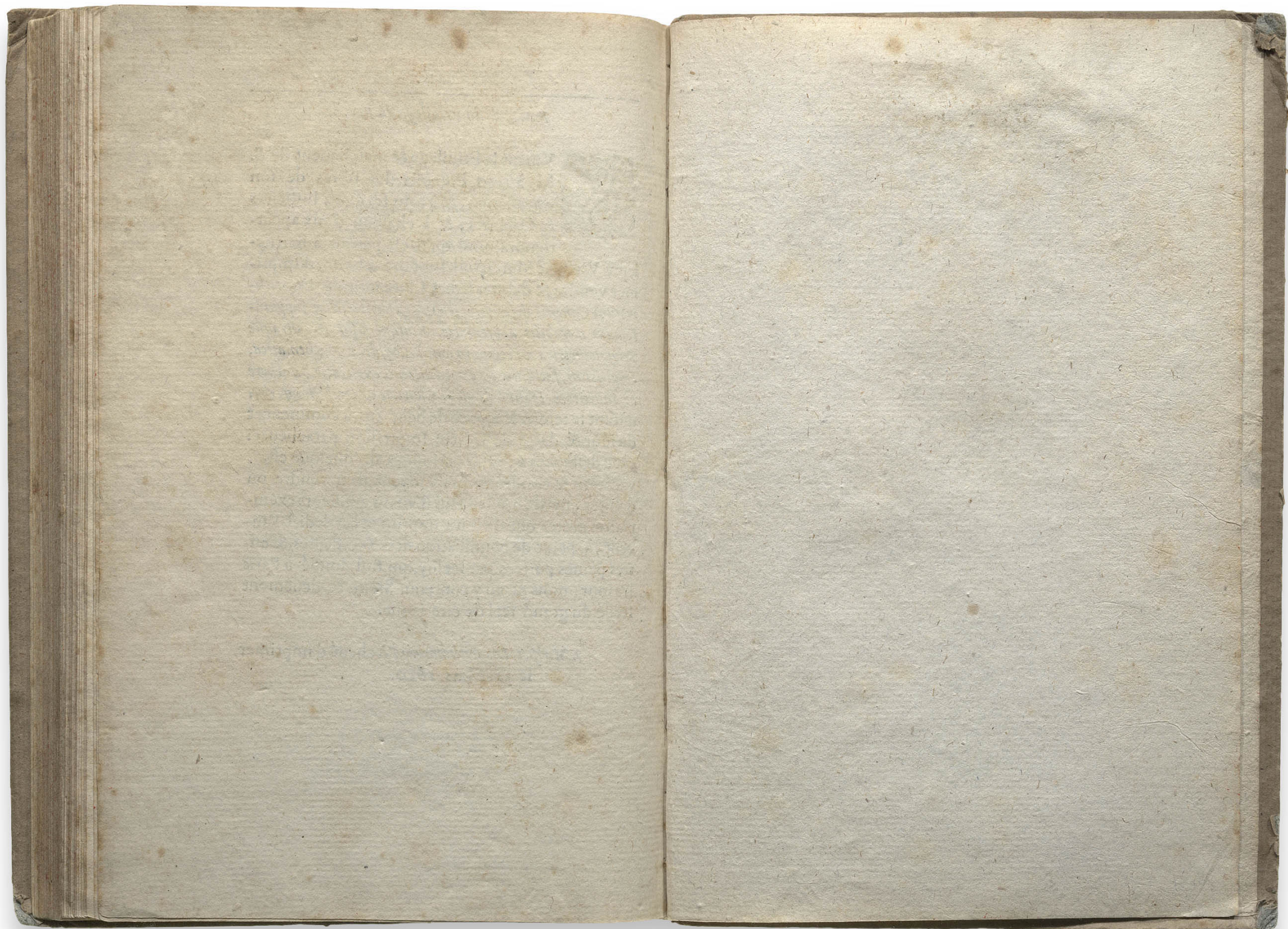


Viuant le Priuilege & mandement de S. M. à tous Preuosts des terres de son obeyssance, & à tous ses amez Iusticiers & Officiers, & à chascun d'eux apparteniendra, ainsi qu'il est permis à Barthelemy Vincent Marchand Libraire à Lyon, d'imprimer vendre & debiter ledict Liure intitulé *Logarithmorum Canonis descriptio, seu Arithmeticarum supputationum mirabilis abbreviatio. Eiusque usus in vtraque Trigonometrica ut etiam in omni Logistica Mathematica, amplissimi, facillimi & expeditissimi explicatio. Authore ac Inuentore Ioanne Nepero: Barone Merchistonij, &c.* durant le temps & espace de neuf ans, à commencer du iour & datte de ladicte Impression paracheuee: avec deffences à toutes personnes de quelque estat, vacation & condition qu'ils soyent d'en vendre ou debiter, ny d'en estre saisi d'un ou plusieurs exemplaires autres que de ceux imprimez par ledict Vincent, à peine de confiscation des exemplaires, & autres peines portees par iceluy, qui fust donné à Paris les iour, mois & an y contenu. Signé & deuëment seellé du grand seel de cire jaune.

*Mirifici Logarithmorum*, Acheué d'imprimer  
le 31. Mars 1620.









Q133  
N35  
1620

★ ★  
Napier  
45153